

LEARNING FROM A RESTORATION INNOVATOR:
BUILDING COMMUNITY CAPITALS AND RESILIENCE THROUGH
THE RESTORATION ECONOMY

By

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ABSTRACT

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In the Mattole River Watershed of northern California, in response to a history of resource extraction, poor land-management practices, and the back-to-the-land movement, a restoration economy has emerged. This economy includes nonprofit watershed groups, individual landowners, local residents, state and federal agencies, foundations and for-profit consulting firms. Utilizing both qualitative and quantitative research methods, this study seeks to reveal how the 40-year community-based restoration economy in the Mattole Watershed has contributed to community well-being and local livelihoods, and how it has changed over time. Results suggest the restoration economy has contributed to a resilient and vibrant community, and has enhanced community capitals – specifically human, social, cultural and political capital. Results further indicate that existing stocks of human and cultural capital enabled the development of the restoration economy, and that there is a circular and reciprocal relationship between community-based restoration and community capitals. This study concludes there are multiple challenges (or perhaps opportunities) ahead – including changes associated with the legalization of cannabis and increasingly stringent regulatory requirements.

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This thesis is dedicated to Freeman House, founding member of the Mattole restoration movement and a great visionary. My work is inspired by his legacy. And to Valery McKee, my beautiful granny, who left this world on a rainy autumn day in 2017. Her unconditional love was a source of power and strength, and will be for the rest of my days.

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INTRODUCTION

This thesis is about the community-based restoration economy in the Mattole River Watershed, CA. It is organized into two chapters, each formatted as a separate article. Therefore, there is overlap in some of the ideas and themes presented. Chapter One focuses on the changing structure of the restoration economy, and recent trends in funding and regulation. It examines how the restoration economy is growing and becoming more professional, and its role in the economic well-being and resilience of rural places. Chapter Two looks at the benefits and challenges of the community-based restoration economy, and focuses on how a restoration economy can contribute to strong stocks of community capitals, while at the same time be reinforced and supported by community capitals. I used qualitative and quantitative research methods. My primary method was a series of 20 semi-structured interviews with stakeholders in the Mattole restoration sector, conducted during the summer of 2017. In addition, I engaged in participant observation by working on two restoration projects in the Mattole headwaters, and drew on my experience living and working in the Mattole community of Whitethorn. I also compiled a database on funding for restoration in the Mattole by administering a survey by email and phone to public and private funding entities.

BACKGROUND

The Watershed

The Mattole River begins its journey to the sea in the rugged, remote, heavily-forested mountains of coastal Northern California. Beginning in the northern tip of Mendocino County, it flows north through Humboldt County for 62 miles, without dams or diversions, before emptying into the sea near the town of Petrolia, about 50 miles south of Eureka, the County seat. The Mattole is joined by over 74 tributaries and drains 304 square miles of mountain, forest, prairie and oak woodland ecosystems, and is home to a diverse array of fish, wildlife, plant and human life (Figure 1).



Figure 1. Mattole River headwaters. Photo by author. 2017.

The Communities

Although the Mattole is a relatively small watershed, its rugged, mountainous terrain and notoriously bad roads make the trip from headwaters to estuary a lengthy journey, taking nearly three hours by car. It is also very remote – from the headwaters, the closest full-service town is Redway, a 30-minute drive northeast through winding,



Figure 2. Map of the Mattole River Watershed (SFI, 2018)

narrow roads. From the estuary it is an hour-long drive north to Ferndale, on an equally winding and narrow road. This has led to a series of small communities, or “towns,” within the watershed. They are all unincorporated and do not have official boundaries. Starting with Whale Gulch in the headwaters, the Mattole River flows through Gopherville, Whitethorn, Ettersburg, Honeydew and finally Petrolia in the estuary (among others) (Figure 2). It is important to note that these are not homogenous groups of people with matching values and beliefs, and restoration initiatives and efforts are no exception. When I refer to the Mattole “community” I am encompassing all of these micro-communities, with the caveat that not everyone supports or participates in restoration efforts, and some outright oppose it. It is also important to note that I grew up in the community of Whitethorn, and worked with a Whitethorn-based watershed group for nearly a decade, which likely has given my research a headwaters-centric focus. However, the majority of interview participants lived and/or worked for the downriver watershed groups, which I hope helped to balance my perspective.

Genocide of the Mattole Tribes and the New Settlers

Like many rural watersheds in coastal northern California, the history of the Mattole is marked by native genocide, waves of settlement and intense resource extraction. Before white settlers arrived in the Mattole, at least three distinct indigenous groups were living there. In the upper-river, the Shelter Cove Sinkyone; mid-river, the Lolahnkok Sinkyone; and down-river, the Mattole (Raphael & House, 2007).

Archaeologists have dated findings in the Mattole back to at least 2,600 B.P. (Raphael & House, 2007), however it is likely indigenous communities lived there much longer. Though an exact date is hard to find, most sources list 1854 as the year white explorers entered the lower Mattole Valley. They noted a dense population of native Indians, and great potential for settlement due to the bountiful natural resources. The first permanent settlement was constructed in 1856 (Roscoe, 1940). The Mattole and Sinkyone Indians were decimated by search-and-destroy missions in the early 1860s. The new settlers waged an indiscriminate war on the native inhabitants, carrying out horrific massacres of entire villages, including women and children¹ (Raphael & House, 2007). By 1868, the native tribes that had lived in the upper and lower Mattole for thousands of years were almost completely wiped out (Cooskey, 2004). Individuals survived, but the languages and age-old traditions were lost (Raphael & House, 2007). The genocide of the native people and the different way of life of the conquering civilization spelled swift, complicated and drastic changes for the plant and animal communities of the watershed, including the removal of the virgin, old growth forest. Logging by white settlers in the Mattole is often cited as one of the biggest contributors to changing watershed conditions and declining salmon populations.

¹ Many women were spared in order to become wives for white male settlers. Raphael and House (2007) document that at one point, many white men lived with Indian wives in the Upper Mattole, and that in 1866 there were 25 children of Indian-white ancestry living in the Upper Mattole alone.

Extraction of Natural Resources

In 1885 a wharf was built at Bear Harbor (near present-day Whale Gulch) to ship tanoak bark and railroad ties (Cook, 1997), and in 1893 the Bear Harbor Lumber Company was founded (Borden, 1964). In early 1908, the Mattole Lumber Company was founded (Frick, 1979). However, the systematic removal of the old growth forest didn't really begin until the late 1940s. Two factors made the Mattole logging boom of the 1950s and 1960s possible: new logging technology, machinery and methods, and a post-WWII market for fir and redwood lumber. A 1952 Humboldt Times article stated that "the need for fir lumber has finally included the quiet and beautiful Mattole Valley" (Hindley, 1952). Four mills opened in Petrolia and Honeydew. Altogether, the four downriver mills had 9 hauling trucks and 8 logging trucks in operation, and employed at least 50 men in the mills and another 26 in the woods. The population downriver increased by 400 people (Hindley, 1952), causing housing shortages and overwhelming school facilities. For the next 40 years the scream of chainsaws and rumbling of trucks and bulldozers echoed throughout the valley and remote hills of the Mattole. By 1988, over 90% of the Mattole's original old-growth forest was gone (Figures 3), and the native strains of Chinook and coho salmon were in danger of extirpation.

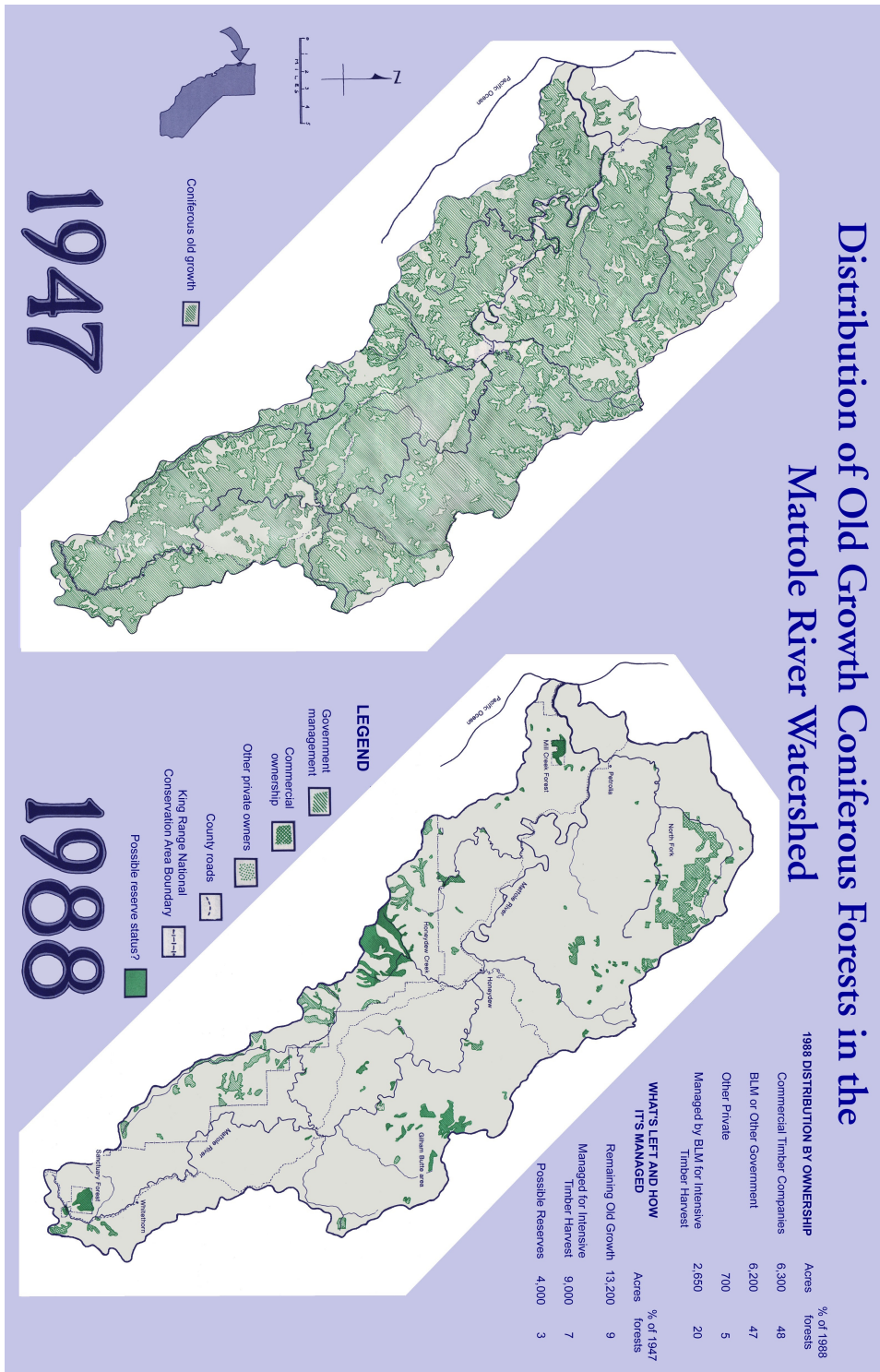


Figure 3. Distribution of old-growth coniferous forest in the Mattole River Watershed, 1947 and 1988 (SFI, 2018)

The Restoration Movement

In the 1970s and 1980s another wave of Euro-American settlers moved to the Mattole as part of the “back-to-the-land” movement. What they initially thought to be paradise they soon realized had experienced severe ecological degradation. In response, these new residents began to organize. By the 1990s community-based non-profits were leading efforts to conserve, restore, steward and manage the unique ecosystems and diverse wildlife of the Mattole. Table 1 lists the three watershed groups that formed in the 1980s with their mission statements and acronyms, which will be used throughout this thesis. In the book *Totem Salmon* (1999), Freeman House highlighted the persistence of the novice restorationists, which culminated in California Department of Fish and Wildlife (CDFW) approval to develop a citizen-run, place-based hatchery program for the recovery of native salmon, the first such program in the state of California (Carlisle, 1998; House, 1999). In addition to the hatchery program, early restoration efforts included community meetings, tree planting, a salmon rearing program in local elementary schools, the formation of watershed conservation and restoration groups, educational, restoration-based theater, and the mapping, measuring and analyzing of the entire watershed – often through hiking, swimming, exploring and getting to know the land in an intimate way (Carlisle, 1998). House argued that through these actions and more, the residents of the Mattole began experiencing a small but profound shift in their relationship to the ecosystems and resources they engaged with (House, 1999). As House explained, “Working together, with our feet in the water, moving large rocks and logs to

armor raw and bleedings streambanks... seemed to carry from our muscles to our minds a buried memory of human communities deeply integrated with the wild processes surrounding” (House, pp. 161, 1999). Over the decades, restoration in the Mattole changed and evolved. This thesis tells the story of that evolution, takes stock of where restoration is today, and examines how it has contributed to the Mattole communities.

Table 1. Nonprofit watershed groups in the Mattole River Watershed

Watershed Group	Mission Statement
Mattole Salmon Group (MSG), founded in 1980	To work to restore salmon populations to self-sustaining levels in the Mattole watershed (MSG, 2018)
Mattole Restoration Council (MRC), founded in 1983	The restoration of natural systems in the Mattole River Watershed and their maintenance at sustainable levels of health and productivity, especially in regards to forests, fisheries, soil, and other plant and animal communities (MRC, 2018)
Sanctuary Forest, Inc. (SFI), founded in 1987	To conserve the Mattole River watershed and surrounding areas for wildlife habitat and aesthetic, spiritual and intrinsic values, in cooperation with our diverse community (SFI, 2018)

CHAPTER 1: COMMUNITY RESILIENCE THROUGH THE RESTORATION ECONOMY

Introduction

Across the nation there has been extensive watershed degradation and declining biodiversity, caused by a history of resource extraction, ranching, agriculture, and development, and compounded by the effects of climate change and a growing human population. Ecological restoration has emerged as a potentially effective tool to help counteract species decline and past land use practices, deliver important ecosystem services and help landscapes adapt to the effects of climate change (Aronson et al., 2010; Clewell & Aronson, 2007; Tidwell & Brown, 2011; Wortley, Hero & Howes, 2013). In addition to repairing ecosystems, there is increasing evidence that restoration has economic benefits (Cunningham, 2002; Egan, Hjerpe & Abrams, 2011; Kim & Hjerpe, 2011; McDonald, Gann, Jonson & Dixon, 2016; Tidwell & Brown, 2011). However, there has been less exploration on if and how the restoration economy contributes to community structure and resilience in the face of rapid change. This chapter seeks to make the economic, social, and cultural dynamics of the community-based restoration economy visible, to document shifts and trends in this relatively new sector – where we are still figuring out how to define it and who is participating – and to identify challenges facing growth. Others have highlighted portions of the restoration economy, finding it contributes to the economy in multiple ways. This study broadens the conversation,

giving visibility to the cultural importance of restoration, and the role it can play in building community resilience.

Through a mix of qualitative and quantitative methods, I assessed the following questions: how does the restoration economy function in the Mattole? How has it changed over time? Who is participating and benefiting from it? How has the restoration economy contributed to resilience, and how can it? I conducted a series of semi-structured interviews, did participant observation, and compiled a database to answer these questions.

Literature Review

This literature review will begin by defining ecological restoration and discussing the concept of a restoration economy – including how it works, and challenges. Next, I will explain the concept of community resilience and identify elements that contribute to or build resilience. Finally, I will discuss how a restoration economy has the potential to build sustainable and resilient communities.

Ecological Restoration

The concept of ecological restoration came to national attention in the 1970s and 1980s (Higgs, 1997). The Society for Ecological Restoration (SER) defines restoration as “the act of assisting the recovery of ecosystems that have been degraded, damaged or destroyed.” While SER does not hold a monopoly on defining restoration, many of the books and articles consulted for this research employed the SER definition as a starting point, or something very similar (i.e. Baker, Eckerberg & Zachrisson, 2014; Clewell &

Aronson, 2007; Kim & Hjerpe, 2011; Higgs, 1997). Part of the difficulty in defining restoration activities is they occur across a variety of scales and have diverse levels of complexity and impact (Baker et al, 2014). Ecosystem restoration can be a “bumpy, experimental, community-engaged practice” or a technologically sophisticated “megaproject” (Higgs, 2005, p. 161). While this study does not attempt to resolve competing definitions, it is important to acknowledge the internal debate playing out in academic research, especially in relation to competing knowledge claims. Dominant narratives surrounding restoration are often closely tied to western notions of scientific objectivity that separate natural science and human science into “two cultures” (Higgs, 2005, p. 160). From this perspective, people are not a part of the landscape and the “natural processes” that restoration seeks to fix. According to Higgs (1997) restoration is at its core about the relationship between environment and humanity, yet there is not a widely accepted view of restoration that explicitly acknowledges people as part of a naturally functioning ecosystem. For the purpose of this paper, I will adapt the general SER definition, but also suggest that the sector is in need of a conceptualization that includes an understanding of diverse knowledge claims and people as part of the landscape or ecosystem in need of repair.

The Restoration Economy

In his 2002 book The Restoration Economy, Storm Cunningham predicted that restoration (of both natural and built environments) would be the major driver of economic growth in the 21st century. Sixteen years later, the U.S. has a highly active and growing restoration industry that contributes to the national economy in a myriad of ways

(Baker 2005; BenDor, Lester, Livengood, Davis & Yonavjak, 2015; Davis, Sundstrom & Moseley, 2011; Kim & Hjerpe, 2011; Thomas, Huber, Skrabis, & Sidon 2016; Tidwell & Brown, 2011). While the organizational structure of the restoration economy varies (i.e. what is counted or included), there is evidence of increasing funding, jobs and capacity in the restoration economy at the community, regional and national levels (Baker & Quinn-Davidson, 2011; Davis et al., 2011; BenDor et al., 2015). According to a 2011 report from the U.S. Forest Service, the restoration economy can, “create jobs while restoring ecosystems to health” (Tidwell & Brown, p. 386). BenDor et al. (2015) found that there were more workers directly employed in restoration than coal mining, logging and steel production, and that the oil and gas extraction industry (not including related services) had less than twice the workers directly employed in restoration. Furthermore, they found restoration projects tended to create localized, relatively well-paying jobs and that other sectors are stimulated or supported (directly or indirectly) through restoration activity. The benefits of the restoration economy are particularly notable in rural communities historically dependent on extractive industries: where traditional industries surrounding natural resources have declined, restoration can offer an alternative economic opportunity (Baker, 2005; Davis et al., 2011; Dabson, 2012; Nielsen-Pincus & Moseley, 2013).

Economic Structure

Depending on the study, the ‘restoration economy’ (also referred to as the restoration industry or restoration sector) can look significantly different. Some articles include mitigation restoration, which is required by law to mitigate for development or resource extraction (Aronson et al., 2010; Kimball et al., 2015). For example, BenDor et

al. (2015) include environmental conservation, mitigation and restoration activities in their definition of the restoration economy. Other studies focus on restoration activities that occur on public lands and are conducted primarily through government agencies like the U.S. Forest Service (Tidwell & Brown, 2011). My research in the Mattole focused primarily on community-based restoration (CBR), which can be understood as a network of interactions between government agencies, private foundations, nonprofit community-based organizations, tribal councils, individual landowners, towns and for-profit businesses (Baker, 2005; Davis et al., 2011; Nielsen-Pincus & Moseley 2013; Thomas et al., 2016).

The CBR funding model consists of grants awarded by state or federal agencies or private foundations to nonprofit community groups, tribes, municipalities, Resource Conservation Districts (RCDs), or individual landowners (Figure 4). Funding is made available through competitive grant programs, often the result of voter-approved bonds or measures, which eligible actors can apply to (Baker, 2005; Davis et al., 2011; Nielsen-Pincus & Moseley 2013; Lurie & Hibbard, 2008). For example, Baker (2005) and Baker and Quinn-Davidson (2011) looked at the restoration economy in Humboldt County and tracked funding that came through grants from state and federal agencies. Nielsen-Pincus and Moseley (2013) conducted a study on the restoration economy in Oregon, focusing primarily on the Oregon Watershed Councils, and funding drawn from state and federal grant programs and the Oregon Watershed Enhancement Board (OWEB). OWEB is funded through a voter-approved measure that gives 7.5% of lottery proceeds to restoration initiatives. In both these examples, funding starts at a federal or state level and

is funneled down to organizations, vendors, businesses and contractors on a local level, and involves collaboration between the different levels and actors. My research utilizes this grant-based, collaborative model, with the addition of private foundations as part of the grant market.

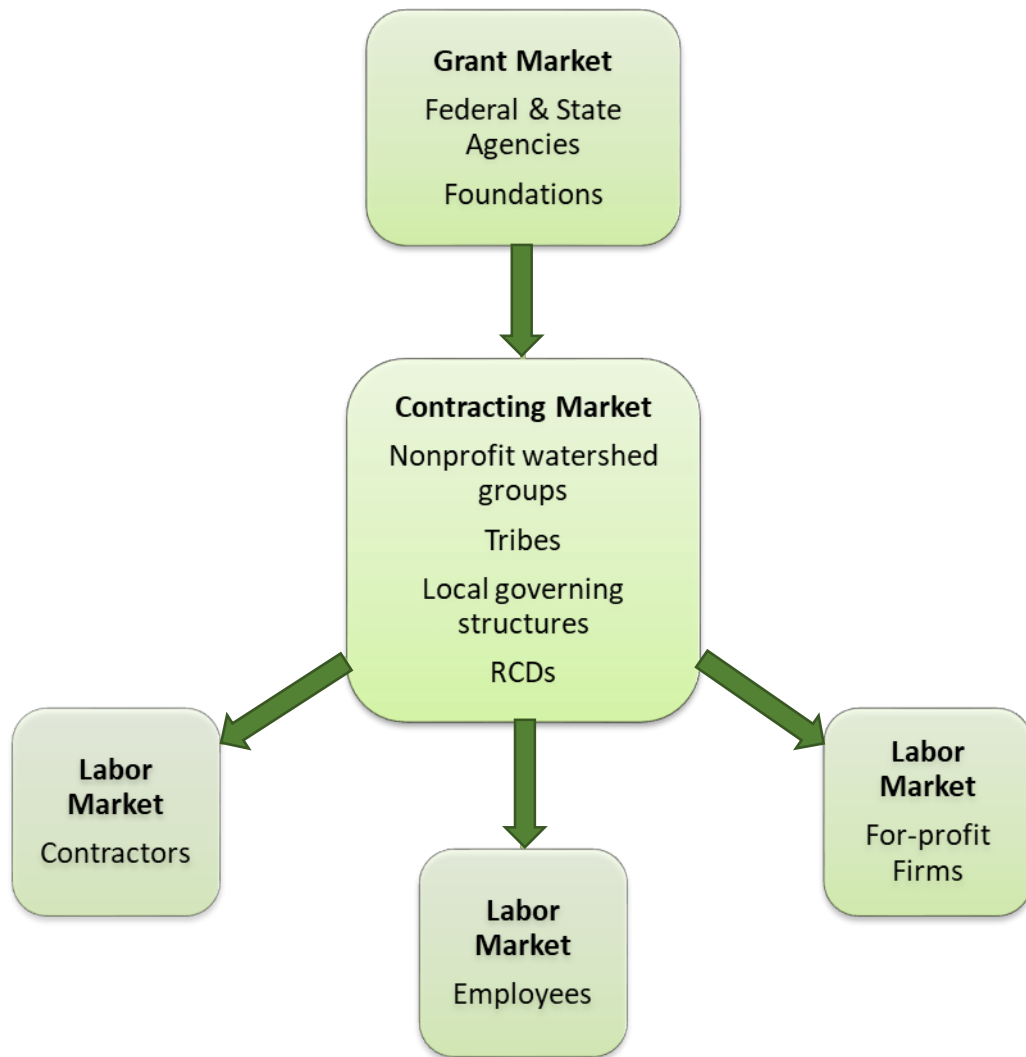


Figure 4. Conceptual diagram of a community-based-restoration economy. Money flows top to bottom.

Challenges in the Restoration Economy

Funding insecurity and bureaucratic hoops

Studies examining a CBR-model have often reported funding instability and regulatory hurdles as challenges to growth and capacity building (Baker & Quinn-Davidson, 2011; Davis et al., 2011; Lurie & Hibbard, 2008). Baker and Quinn-Davidson (2011) characterized the restoration economy as a “funding rollercoaster” full of “bureaucratic hoops” (p. 225). For restorationists working in CBR, regulation and permitting barriers can present a significant challenge, as a daunting array of permits are needed to implement a restoration project (Baker & Quinn-Davidson, 2011), often from multiple state, county and federal agencies (such as the State Water Resources Control Board and the Department of Fish and Wildlife). Government regulations can be outdated and/or excessively rigid, causing restorationists to spend their scarce time and resources on “one-size-fits-all” project designs and models that are inappropriate for the site in question, and preventing development of innovative, adaptive, site-specific programs that reflect the inherent complexity in the practice of restoration (Baker & Quinn-Davidson, 2011; Lurie & Hibbard, 2008).

‘Professionalization’ of the Industry

As the restoration economy grows, there has been a noteworthy contribution to the literature that suggests economic growth is causing ecological restoration to become more formalized and is pushing the field towards professionalization, resulting in an emphasis on efficiency, effectiveness, western science, and technology (Baker & Quinn-

Davidson, 2011; Blaike, 2006; Higgs, 1997; Higgs, 2005). Higgs (2005) defined professionalization as specialized techniques and certifications, standardized strategies, and growing consultancies and bylaws, and argued a consequence could be the displacement of community-based, largely volunteer projects. In their 2007 study of Humboldt County, Baker and Quinn-Davidson suggested that as the restoration section expanded, there was “an inherent tendency to conform to dominant social rationality” (Baker & Quinn-Davidson, p. 221, 2011), meaning they saw greater emphasis being put on science, technology and efficiency, and suggested that funding was going to fewer, larger, more technically and ecologically complex projects that tended to favor larger firms with the skills and capacity to manage large-scale projects. They claimed that in many cases, small organizations and non-profits may lack the expertise and subcontracting capabilities to provide them with a competitive edge. This sentiment was echoed by Davis et al. (2011), whose interview subjects claimed the “low hanging fruit” was gone, and watershed councils and agencies were looking at a future dominated by more complex and skill-intensive work.

Community Resilience Framework

Researchers have utilized the community resilience framework to study communities’ ability to respond and adapt in the context of disaster (natural or human-caused) (Cinderby, Haq, Cambridge, & Lock, 2016; Kulig, Edge, Townshend, Lightfoot, & Reimer, 2013; Pfefferbaum, Van Horn, & Pfefferbaum, 2017). Community resilience theory has also been used in research surrounding the development of sustainable and

vibrant communities (Callaghan & Colton, 2008; Donoghue & Sturtevant, 2007; Magis, 2010).

Community resilience theory is based on the premise that communities are complex, dynamic, constantly changing, and prone to periodic and unexpected external and internal crises (Callaghan & Colton, 2008; Donoghue & Sturtevant, 2007). Change is seen as a constant – a community is inhabited by successive waves of people and utilized for different things over time (Magis, 2010). Community resilience theory challenges the notion that a healthy system is a stable one, and instead argues that a healthy, sustainable system is resilient: it persists through a cycle of adaptive renewal, triggered by cycles of change (Magis, 2010). Therefore, resilience is determined by the ability to adapt, transform and/or thrive in an environment of uncertainty, unpredictability and change (Cinderby et al., 2016; Magis, 2010; Pfefferbaum et al., 2017). Part of community resilience theory is the recognition that at times, internal transformation is required. Disturbances create opportunities for new or enhanced systems to develop or recombine, thus renewing them and creating space for innovation, new energy, and ongoing viability (Kulig et al., 2013; Magis, 2010). A resilient community has the ability to thrive on disturbance (Kulig et al., 2013).

Norris, Stevens, Pfefferbaum, Wyche and Pfefferbaum (2008), claimed resilience emerged from linkages between four networked adaptive capacities: economic development, social capital, information and communication, and community competence – what they referred to as a community resilience framework (Table 2). Most of the literature on community resilience identifies similar attributes, or employs this

framework (Callaghan & Colton, 2008; Houston, 2015; Houston et al., 2015; Magis, 2010; Pfefferbaum et al., 2017; Sherrieb et al., 2010).

Table 2. Community Resilience Framework, following Norris et al., 2008 and Sherrieb et al., 2010.

Components of Community Resilience	Description
Economic Development	Level of economic resources, degree of equality in distribution and scale of diversity in economic resources
Social Capital	Social support, social participation and community bonds
Information and Communication	Provision of opportunities for residents to articulate needs, views and attitudes, channels for informing the public, narrative
Community Competence	Ability to learn about shared risks and options and work together flexibly and creatively to solve problems, capacity to acquire trusted and accurate information, to reflect critically and solve emerging problems

Economic development is based on three factors: the level of economic wealth or resources available to residents, the degree of equality in the distribution of wealth or resources, and diversity of employers and industries so the local economy is not overly-dependent on one source (Norris et al., 2008; Sherrieb et al., 2010).

Social capital can be understood as the “social infrastructure” that helps a community recover from disturbance or change (Aldrich & Meyer, 2015; Clarke & Mayer, 2017). Aldrich and Meyer (2015), in the context of community resilience, defined social capital as the involvement and participation of local residents in groups and activities that foster positive bonds, bridges and links. They argued support for and

participation in group meetings, social events and local projects could increase trust and social cohesion (Aldrich & Meyer, 2015).

Information and communication is concerned with how information is distributed to the public, and systems of communication and narrative within the community (Norris et al., 2008). According to Norris et al. (2008) good systems of information distribution should be accurate, trusted and as local as possible. Additionally, the local community should be included as an ally in the process of information generation and distribution, and the system should reflect local values and priorities (Norris et al., 2008).

Communication refers to the provision of opportunities for residents to articulate their needs, views and attitudes, and to shared meanings and understandings among community members (Norris et al., 2008). Shared meanings and understandings can grow out of shared experiences, and can contribute to a sense of place and social bonding (Norris et al., 2008).

Community competence focuses on collective action and decision-making, and collective empowerment. Collective action and decision-making depends on the community's ability to learn about shared risks and options, acquire trusted and accurate information, reflect critically, and to work together flexibly and creatively to solve problems (Norris et al., 2008). Collective empowerment has to do with fair distribution of access and control over resources, and the ability to gain greater access and control (Norris et al., 2008).

Community Resilience and the Restoration Economy

Many rural American communities have experienced dramatic socioeconomic restructuring since the 1980s as traditional industries decline and people relocate to urban centers (Gosnell & Abrams, 2009; Hibbard & Lurie, 2013; Stauber, 2001). Persistence for such communities depends on their ability to adapt to these changes, and develop new, diverse economic sectors. Amenity-rich areas have experienced economic growth as people migrate for tourism, recreation and retirement (Gosnell & Abrams, 2009; Lurie & Hibbard, 2013). But in some places, especially those centered on primary production in natural resources and agriculture, socioeconomic health has continued to deteriorate (Hibbard & Lurie, 2013). However, the emerging restoration economy suggests an alternative opportunity for rural communities. Watershed restoration, community forestry, and other sustainable natural resource activities have the potential to be one element of a new rural economic base. The restoration economy can help diversify rural economies, increase local resilience, and be a compliment to traditional natural resource sectors, amenity-migration and tourism (Hibbard & Lurie, 2013). A restoration economy creates jobs, brings in financial capital, develops local skill, capacity and leadership, and fosters collaborative partnerships between local and regional institutions (Baker & Quinn-Davidson, 2011; Dabson, 2012; Davis et al., 2011; Kittinger et al., 2016). Importantly, recent studies suggest the restoration economy can also work to enhance and build social networks, and revitalize cultural practices and traditions (Hibbard & Lurie, 2013; Kittinger et al., 2016).

Methods

I employed a mixed methods approach, which entails collecting and analyzing both qualitative and quantitative data in one study (Creswell, 2007). I framed the data collection and analysis process using case study design.

Case study design

Case study design is a type of observational research that excels at building in-depth description and understanding of a specific situation (Newing, 2010). A case study aims to provide detailed understandings for the purpose of generating a theory about underlying issues. The Mattole is a good case study because, 1) through past experience, I have knowledge about and access to the restoration sector (practical), 2) the Mattole has a long history of ecological restoration and an established restoration economy (theoretical), and, 3) restoration and related activities are a well-known and significant part of Mattole culture – from nonprofit watershed groups to high-profile collaborative projects, the Mattole is known for its restoration community (prominence) (Newing, 2010).

Qualitative – Semi-Structured Interviews and Participant Observation

Semi-Structured Interviews

I conducted a series of 20 semi-structured interviews with key stakeholders involved in Mattole watershed ecological restoration. Stakeholders included past and present non-profit employees, an agency employee, landowners and community elders (appendix A). I developed an interview template with open-ended questions and prompts

(appendix B). Interview questions varied slightly depending on the participant (their role in the restoration economy) and my relationship to them (I had extensive knowledge about the expertise of some participants, and would ask questions that related to their specific experience and knowledge). Participants were chosen based on snowball sampling and my experience living and working in the Mattole. Each interview lasted between 1.5 and 3 hours. Interviews took place in participants homes, in restaurants, at restoration sites, and in participants places of work. Each interview was partially transcribed and then analyzed for key reoccurring themes. I ended up with 10 major themes, such as changes/trends in funding, benefits of CBR and challenges of CBR. Each theme was entered into an excel spreadsheet with a series of secondary codes. For example, the theme “changes/trends in funding” included the secondary codes of “decreases in funding, competition for grants, competition with cannabis” etc. Each secondary code was populated with quotes, and measured by frequency (did every participant bring it up?) and explanatory power (did it address my questions? How important was it to participants?).

Participant Observation

Between interviews, I volunteered with a crew implementing a restoration project in the Mattole headwaters, and worked installing monitoring wells along McKee Creek (a tributary to the Mattole). Both experiences helped frame my research, and allowed me to spend time conversing with restorationists and observing restoration.

However, my participant observation in the Mattole goes much deeper and stretches back much longer. First, I am a fifth-generation Whitethorn resident. Growing

up my family instilled in me and my siblings a love and respect for the river, the fish and the land we lived on. I learned to swim in the Mattole, raised and released baby salmon at Whitethorn Elementary School, and had my first science lessons collecting water bugs and visiting old-growth redwoods on school fieldtrips. During the summers of 2007, 2008 and 2009, I interned with SFI measuring and recording streamflows and monitoring conservation easements. In 2010 I began working full-time with SFI as the Education and Development Coordinator, where I worked closely with the community to elicit their ideas, knowledge, concerns and support for restoration, conservation and education projects. For six years I ran an educational hike program, organized fundraisers, coordinated and led community meetings and workshops, hosted quarterly radio shows, ran a scholarship program, and wrote appeal letters, articles and press releases about SFI's work in the Mattole headwaters. For nearly a decade, I had a front-row seat to CBR in the Mattole, and spent hours out in the field learning about restoration projects from local and regional experts in order to be a bridge and educational resource for my community. Due in part to this close relationship to the watershed, my research reflects and is influenced by my concern for the vitality and persistence of plant, animal and human community well-being in the Mattole watershed.

Quantitative – Survey

In 2016 I began collecting data on funding for restoration in Humboldt County. I focused on public agencies and private foundations between the years of 2008-2016. I did this through an email survey, followed up with either a phone conversation or email correspondence. The survey was administered to 17 state and federal agencies and 13

foundations, and asked participants to provide a spreadsheet breaking down funding by year, project, watershed, grant amount and grantee (appendix C). During the writing phase of this thesis, I choose to narrow my focus and only look at the restoration economy of the Mattole Watershed. Of the 17 public agencies contacted, 8 awarded grants to the Mattole and were included in this study. Of the 13 foundations, 6 contributed to the Mattole and were included.

State and Federal Agencies

Public agencies were chosen based on Baker and Quinn-Davidson's study of the Humboldt County restoration economy (2011) and on my knowledge of grant funding through working for SFI. The final 8 agencies included in this study represent the largest public funders in the Mattole restoration economy. The goal was to get a reliable estimate of the amount of public grant funding entering the Mattole each year between 2008-2016 for restoration activities.

Foundations

I chose to include a sample of private foundations in this study for two reasons: 1) I worked for a nonprofit watershed group and saw first-hand the role of foundations in reaching financial goals for restoration projects, and 2) many participants commented on the growing importance of foundation funding. While their contribution is often on a smaller scale, it is critical in order for community groups to successfully design and implement restoration projects. Many of the big public grants are only for implementation, and will not cover things like administration, monitoring, and employee salaries not directly related to the project at hand. In addition, most public grants require

a cost-share, which can be made up of individual donations and foundation grants and awards. There are many more foundations that contribute to the Mattole restoration economy than included in this study. For example, Mattole watershed groups have received funding from the Humboldt Area Foundation, Trees Foundation and Grace Us Foundation in addition to the 6 listed in this study. The goal was to make visible this part of the restoration economy, though the contribution of foundations is likely underestimated.

Organization of Data

The survey sent to funders defined restoration as, “the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed” (SER). In addition, the survey stated that, for the purposes of this study, I was including planning, monitoring and education as part of the restoration process. After receiving a spreadsheet, I selected all the projects that fell within the Mattole Watershed, and carefully edited to check for projects that fell outside my scope. I included funding that went to the planning, design, implementation, monitoring and education of restoration projects, and to youth programs with a strong restoration focus.

Results

This section is organized into three parts: part one discusses the history of CBR in the Mattole, and argues that “waves” of restoration have resulted in structural changes in how CBR functions. Part two looks at changes in the restoration economy over the past

decade, and examines the idea of an overall “professionalization” of the industry. Part three looks at the quantitative data collected on restoration in the Mattole Watershed. This section seeks to illustrate the robust restoration economy functioning in the Mattole, and to highlight the economic contributions and limitations of CBR in the Mattole.

Part 1: Structural Changes in CBR in the Mattole

Participants identified an over-arching shift in the Mattole restoration economy. They reported that over the 40-years of CBR, there had been significant structural changes in how CBR operated, and in the people who participated. Based on participant testimonies, I will differentiate these shifts as “waves” of CBR (Figure 5).

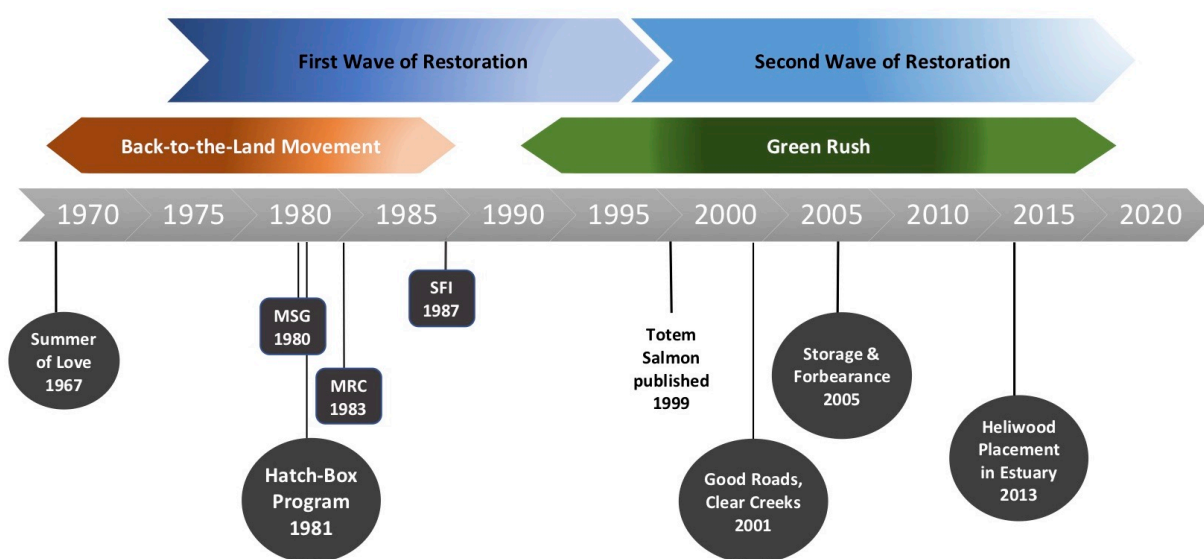


Figure 5. Timeline of CBR in the Mattole Watershed. The native hatch-box program was implemented by MSG and went from 1981-2004. Good roads, Clear Creeks was implemented by MRC and went from 2001-2012. Storage and Forbearance was implemented by SFI, began in 2005 and at the time of this study (2018) was ongoing. The heliwood placement project was implemented by MSG between 2013-2016, and may continue in the future.

Beginning of a Restoration Movement: First Wave

The first wave of CBR was set in motion by the arrival of the back-to-the-land movement to the Mattole. The founding members of the Mattole Salmon Group and the Mattole Restoration Council trickled into the watershed throughout the 1970s, and by 1983 both groups had been established and the native hatch box program was in full swing. In 1987 Sanctuary Forest Inc. was created, bringing conservation and restoration into the headwaters communities. Participants described the back-to-the-landers as people predominantly from major urban centers, who moved to rural areas in the 1970s and 1980s in a “conscious effort to start a new model” – a model not based on materialism, consumerism or capitalism. One participant described how the back-to-the-land movement was borne out of the ideas of bioregionalism and reinhabitation, and described bioregionalism as “a quasi-philosophy that every place on the planet is different, and our cultures and our economies should reflect that. And the distinctions of place should manifest themselves in our cultural and social adaptation.” He went on to explain that some of the back-to-the-landers “saw ourselves as re-inhabiting a landscape.” Another participant described the energy of the time, and how some of these people ended up in the Mattole,

There was this group called the Diggers, and they were theater people, some came from New York, and (some came) out of the summer of love. A lot of them decided to go back to the land. (They) had families that were probably middle class, and many of them had educations, some of them PhDs and masters. But everybody (was) dropping out... and it came to this crescendo like a big flower, like a big, beautiful flower coming to fruition, with this big flower head and the seeds went poof! Into the air, and some of them landed in the Mattole.

It was those back-to-the-landers who started CBR in the Mattole, some of whom were interviewed for this study. One participant, reflecting on those early years of restoration, explained,

Our first struggle was with the Fish and Wildlife, because they didn't know what to do with us. They did not easily accept nonprofessionals, nongovernment personnel, taking responsibility for their watersheds, it was their jurisdiction. Invariably we would suggest, okay, the job needs to be done, you're not going to let us do it, (so) do it yourselves. All of a sudden, the specter of an army of re-inhabitants, taking up the job of restoration, formerly parceled out meagerly to government personnel, was a little overwhelming to the government. It took a little while, but the Department of Fish and Game by then was aware that we were a force that had to be dealt with.

First-wave participants remarked on the excitement of the time, especially when they began the hatch-box program – according to participants, the first native hatch-box program in the country run by local citizens. They explained how they went out and found professionals and scientists who could teach them about laying the groundwork and implementing a restoration program, how they learned through mapping, measuring and analyzing the entire watershed, and how they trained other local residents to do monitoring and surveys. One participant said,

I don't think anybody had ever really done quite like we did before... we had educated ourselves up to a point, we went out and got commitments from people in almost every tributary, and trained them in the science of survey. What to look for, how to look for it, how to systematically record it, collecting data basically. Some of the first persistent and widespread body of data that had ever been gathered, certainly ever in the Mattole.

The first wave was marked by a spirit of innovation, creativity and by a set of cultural values and beliefs brought by the back-to-the-land movement.

Shifts in CBR: Second Wave

In the mid-to-late 1990s, some new faces began to appear in CBR. Some of them came specifically for the restoration movement. One participant described his arrival in the mid-90s, saying, “I was mostly intrigued by the history – it was the oldest citizen-led restoration effort, and it really fit my interests. I came out and met the people and saw the place, and the rest is history. I’m still here.” Around the millennium, the second wave became more established: there was a change in leadership at MRC, one that many participants highlighted as a marker of significant change. Freeman House, one of the founding members of MSG and MRC – described by one participant as “our visionary” – stepped down from his leadership role. At the same time, an ambitious young man from outside the watershed was hired to be the executive director at MRC, and, unlike the back-to-the-landers, he was seeking a professional career. One participant explained how the new director “changed the landscape radically” through his ability to attract funders to the watershed. Another participant argued the new director “really took the organization from bare bones, grassroots, really part-time to like, when I got there, there were 25 employees, most people full-time, million-dollar contracts.” The restoration economy began to take off – there was a lot more money available for restoration, and, in the words of one participant, they had someone in a leadership position who was “a master at getting huge amounts of money.” In 1999 Freeman House published his book Totem Salmon, which chronicled the restoration movement in the Mattole up until that time – another sign that one chapter was ending and another beginning for CBR in the Mattole. The second wave of restoration gained momentum in the early 2000s: in 2001

the Good Roads, Clear Creeks program through MRC was implemented, which decommissioned and fixed roads and replaced culverts throughout the watershed, creating a lot of work for local contractors and bringing large grants into the watershed. In 2002 SFI began to shift their focus from land conservation to water projects, notably with the hire of another ambitious individual, a fourth-generation local woman who spearheaded the Storage and Forbearance Program. This program gave landowners professional and permitted water systems capable of storing 50,000 gallons of water in exchange for entering into a legally-binding, 15-year agreement not to pump from the river or tributaries during low-flow periods (typically from July-November). As of 2017, the program had over 20 landowners enrolled – as well as Whitethorn Elementary School and the Whitethorn Construction complex, which included several local businesses and residential units – and according to participants many more landowners were participating on their own by purchasing storage systems, and voluntarily forbearing from pumping by observing the “stop pumping” dates posted by SFI on their website and roadside signs. The Storage and Forbearance Program prompted another boom in local jobs, and brought millions into the valley.

The years between 2000-2010 were also when the restoration movement experienced an influx of young, formally-educated professionals, drawn to the Mattole by the CBR-economy. One participant observed, “we have significant numbers of young people who come to the valley, are attracted here by the restoration movement. Usually college students or recent college graduates.” Another, referring to CBR, pointed out, “It’s definitely brought a lot of people here, and/or retained people here.” There were two

major themes identified by participants as defining features of second-wave CBR: a shift from volunteer to career-based restoration, and a change in local participation.

Volunteer to career

There was general agreement among participants that CBR during the second wave had become much more career-oriented than in the early years. One participant explained how in the beginning, “a lot of the groups here weren’t paying anybody, they got a few thousand dollars to pull off the project, and everybody just put in the time that they could... really, very admirable, a real cooperative model that they had.” Another commented how back then they hardly had any money, so they all volunteered: “that’s just what we did... some of our projects began getting funded in the early 80s, but it was just tiny amounts, without volunteers we would never have been able to do it.” The first wave of restoration was marked by a significant volunteer effort. However, the second wave was made up mostly of people who wanted to make restoration into a career; who wanted to get paid for their time and did not have other significant sources of income. One participant, discussing this shift in CBR, argued,

I think one thing that is hard for (first-wave restorationists) to see, because they kind of did restoration as a passion, a hobby, they were growing weed, had money to do these projects... when I started doing this I was like this is my career, I want to make money, I want to do what I love, I think they find it hard that we don’t volunteer as much. But it’s like, well, this is our career, this is what we’re doing, we want to be paid. That’s sometimes a point of contention, like we should be out there more as a grassroots effort, whereas I look at it as a professional career.

Another participant pointed out, “volunteering is great, but it’s not going to get the ex-logger to show up, who has real bills to pay. It won’t get low income people, or heavy equipment operators.”

Many participants pointed out how important it is for people to have jobs that make a positive difference in the world, or that train young people to be good stewards and connect with nature. One participant said, “the old-timers, they were willing to work for free because, that’s what they did, they loved the place, they volunteered. These young people want to get paid for all their time. I don’t blame them. They should get paid.” Another asserted that, “we were fortunate to have these volunteers at the beginning of our groups, but it also is really nice to feel like, okay, you can be of service to the land and make a little bit of money.”

Participants indicated the shift from volunteer to career was partly connected to the cannabis shadow economy, and with the instability of living in the watershed. First-wave participants moved to the watershed at a time when land was very cheap, and Mattole residents were just beginning to discover they could grow cannabis on the side to make ends meet, which according to participants made spending countless volunteer hours getting the restoration movement off the ground feasible. Second-wave participants moved to the watershed just as the green rush was gaining momentum (Figure 5): land prices were soaring, and the resident population was changing as people bought land for the sole purpose of illegal cannabis farming. One participant argued that, because of the green rush, second-wave restorationists were not as connected to place. He argued that unlike the older generation, who were able to buy land and were committed to living

long-term in the Mattole, second-wave restorationists did not have the stability and security of owning property. Another participant explained that the organizations get “a lot of young people who come to learn, and then they move on to more stable places.” He observed that even those who wanted to start a family or buy land could not afford to, because the green rush had driven the price of land through the roof. Some second-wave participants expressed that eventually, they would probably have to leave, as they could not afford to stay.

Shifts in local participation

Participants identified a shift in the makeup of local participation as another characteristic of second-wave CBR. The second-wave restorationists wanted careers, but also, they arrived in tandem with the green-rushers: people who did not necessarily care about place, or even good stewardship. One participant contended that,

I think in the 80s it was a point of pride to volunteer the most hours for the salmon. You don't see that as much now, and the Restoration Council has struggled with getting people just to come out and volunteer... it would be nice to see more informal volunteer participation from the community.

Participants felt that the local residents of the Mattole were just not as interested in restoration anymore. The population had shifted, and there was no longer that core group of back-to-the-landers². Many were aging, their children and grandchildren had left the

² It is important to point out that the population and culture of the Mattole during the first wave was not homogenous. Back-to-the-landers were a minority, and their arrival in the watershed caused mixed reactions. Participants reported conflict with ranchers and loggers, including open hostility and mistrust on both sides.

watershed or were primarily growing cannabis, and a large percentage of new residents were there for the shadow economy.

All participants agreed that the green rush had a tremendous effect on CBR, especially on local involvement and participation. One participant argued that before cannabis cultivation began “dominating people’s lives and the economy” there was more interest and time available for CBR. Then it became a challenge to find people who wanted to work, much less volunteer. He explained,

You hire people and they go well, okay, I can work 2-3 days a week, these are the hours I can work, and come October and November I might not be very available. And if you’re not willing to put up with those sorts of employees you don’t get any employees at all... and that’s still one of the underlying frustrations.

Participants said the restoration economy was dwarfed by the cannabis economy, even crippled by it. They explained how finding people who wanted to work in restoration became very difficult. “We can’t compete with wages, there’s no housing because the houses are all being taken up by people in the industry,” remarked a participant, “It’s a real challenge. Back in the day we always had an abundance of volunteers and people willing to work, and those have all faded away.” Participants explained how expansion of cannabis cultivation pushed CBR onto the sidelines: when the Campaign Against Marijuana Cultivation (CAMP) was in its heyday (late 80s and early 90s), residents had to be limited in their cannabis cultivation and people had more time, but with the decline in enforcement “everybody is putting everything into it, 100%, and we don’t have any time for managing our landscapes in a personal way.” One participant described how in the mid-80s, it was not difficult to get “a heavy-duty crew of 12 people together” but

when the cannabis boom really took off, “15 dollars per hour was not such a draw anymore.” Participants also commented on how the culture of cannabis differed significantly from that of CBR. They pointed to the “openness” in the 70s and 80s, and argued that cannabis changed that. While the back-to-the-landers brought with them a belief in caring for the land and for each other, the green rush ushered in an era of paranoia, distrust and secrecy. “And so how can you work together if it’s that way?” one participant asked. Another participant remarked,

I actually have been hoping for the crash of the cannabis economy for so long, because one of our issues has been finding the personnel to do the projects all the time. I feel like the illegal cannabis economy in the beginning wasn’t a wedge, but became a wedge once people just moved here for that and just wanted to do that and create their walls. There are like rows of fences now in Petrolia. It’s ridiculous. I don’t know, it’s just changed so much.

Participants indicated the green rush, and the challenges posed to CBR, were on the brink of change. At the time of interviews (summer 2017), cannabis had just been legalized in California, and people were in the midst of a “race to the bottom.” As this participant put it,

It’s just there hasn’t been anything to really bring us together. And especially in the last, I want to say five-six years. That’s when the green rush has really accelerated. And it went from seeing people during the summer and hanging out, and being like, how are you doing? And they say good, to being like, how are you doing? And they say busy. And that’s what everybody says. That’s what I’m doing, I’m busy. So, I think everybody’s just caught up in that rat race and they don’t have time anymore, and they’re scared that their way of life is gonna be gone, and they don’t know what they’re going to do about it. And that uncertainty is terrifying for pretty much everybody.

Challenges posed by the illegal cannabis industry to CBR were a chief concern among participants. However at the same time, participants recognized that legalization would bring significant change, and that the uncertainty of the future was a source of unease in the watershed.

Part 2: Trends in the Restoration Economy

Participants indicated there were clear trends and shifts in the restoration economy over the last decade. The two most commonly-cited funding-related trends identified by participants were: the restoration economy had become professionalized, and it was increasingly difficult to secure funding for restoration projects and programs.

Professionalization of the Restoration Economy

Participants identified a shift towards professionalization within the restoration economy. They felt that as the restoration economy grew, there was a trend towards a more structured, regulated and professional industry. They argued this professionalization translated to tighter regulations, more complex designs and projects, and more engineering and permitting in the planning process. This was seen as a significant change to how restoration used to operate in the Mattole. One participant argued that getting permits and submitting proposals was considerably less difficult ten or even five years ago. As an example, he explained how he used to take agency personnel out into the field and point to where a project would go, and draw project designs by hand. Another participant commented,

It's required more and more levels of expertise. It used to be we could sit around in a room and come up with our thought of what ought to be done and we could write a grant and pitch it to the appropriate agency and likely

we'd get funded. Now we hire professional consultants, be they hydrologists or geomorphologists or geneticists. We end up having to submit grants just for expertise. So, on the one hand, that means that the quality of our work has probably gone way up. But it's driven the cost through the roof and it's really lengthened the time frame.

There was general agreement among participants that a decade previously, it was easier to get proposals approved, and with much simpler designs that did not require a professional from outside the watershed. One participant argued the increasingly stringent proposal requirements and technical review process was the inevitable outcome of the "consolidation and professionalization of the restoration industry."

Benefits of professionalization

Most participants indicated that professionalization had positive impacts on CBR. One participant observed, "the professionalization of the industry has these great benefits of people getting better at what they do, making better projects that really accomplish what they set out to accomplish." Others discussed the longer planning process, and argued even though it took more time, it also caused, "more of a reflection both scientifically and visually," and forced project proponents to consider, "what's going on? Where did we go wrong? Or what did we do right?" One participant explained how she used to dread the long meetings and focus on planning, and always felt they should just get out in the field and get to work. However, through closer engagement with the process, she changed her mind.

I feel like it's a much more poignant way to deal with restoration efficiently. We know what we're proposing, we know what the other groups are proposing, we're doing it based on our strategic plans... I was always the one like come on, let's just go on the ground. But I get it now, it's built up a stronger restoration community.

Another participant discussed how professionalization led to deeper engagement with the scientific process, and caused watershed groups in the Mattole to spend more time upfront really thinking about the goals and objectives of projects. Some participants argued that an added benefit of working with permitting agencies was a lot of them, “bring in a larger view... they’re engaged with these projects region wide, and you may be proposing a project that was tried over in the Scott River or Shasta River, and you get meaningful feedback during the permitting process on project design.” The general consensus was that the growth and professionalization of the restoration economy led to better, more complex projects, to the sharing of knowledge, and to a more thoughtful and reflective process.

Challenges of professionalization

Participants also reported that, at times, professionalization had negative impacts on CBR. A common critique mentioned by participants was professionalization led to significant increases in time and money spent on projects. One participant pointed out,

The intent is good in terms of it really forces the project proponents to think through their projects, design them, mitigate impacts... but at the same time it’s daunting... Army Corps, NOAA, U.S. Fish and Wildlife, DFW, Water Quality Board, Coastal Commission if in the coastal zone like the Mattole estuary. So, it’s a huge work load.

Participants expressed their frustration with statements like, “regulation’s totally gotten out of control” and “we’ve lost the ability to quickly respond to a situation.” Participants felt the onerous permitting pathways, heavily regulated design process and restrictive restoration manual could end up doubling project cost and adding years to the timeframe,

while the threat to salmon continued and climate change presented new challenges that required flexibility and outside-the-box thinking. During one interview, conducted along the banks of the Mattole River, the participant gestured to the armored banks and anchored wood structures that had been implemented over 30 years ago, and remarked, “you never could do this today. Fifty-thousand dollars for twelve sites? They wouldn’t let us do it.” Another participant argued too much money was spent on design, and not enough on implementation. He explained that five or ten years previously, fifty-thousand dollars would have paid to put ten pieces of wood and twenty yards of rock in the river channel – whereas now it would pay just for the design of the same project. The general argument was that at some point, the planning and permitting process could become counter-productive, monopolizing staff time and driving up project costs. One participant explained,

We’ve come to the place now where we’re putting in a lot of planning proposals. Some of these projects the planning’s gonna cost more than the project. And, that’s in a sense a fool hardy approach on the part of the state. With dynamic systems like streams, from the time we start developing projects to the time they hit the ground is two to three years, and sometimes you come there and conditions have changed. What you planned to do no longer makes any sense at all.

Participants contended that too much focus on design and engineering could be a waste of resources, since nature is not static and often changes between the time of design and the time of implementation.

Participants worried that professionalization might make it more difficult for small-scale watershed groups to participate in the restoration economy. While they approved of the growing restoration science, the attention to design, and the inclusion of

trained engineers, there was concern about consequences for rural groups or landowners without official training, degrees, or licenses. One participant commented, “It’s starting to knock the non-professionals out.” Another participant remarked,

To participate in a regulated thing that deals with workers comp and health and safety you do need to have a certain scale, but at the same time you’re tearing the ownership away from the most grassroots participants, and that is not a good thing.

Participants believed the state was slowly moving away from funding smaller watershed restoration projects, especially if they did not “have a nexus to significant infrastructure and municipalities,” and worried restoration had become too complicated, and required specific degrees that most rural people did not have. “What we’re losing is the grassroots,” argued one participant, “we’re losing the fact that the people who are living on the land, who are seeing the problems and wanting to do something about it, they become disempowered because they can’t just fix what they see to be the problem.” The argument was professionalization was changing “who can compete.” As one participant put it,

It makes it easier for municipalities to compete in that kind of a world because they can afford to pay for their onboard engineers, planners, designers and lawyers, to put together all the plans and permits ahead of time, use that as matching cost to then get the million-dollar grants to do whatever with their water infrastructure. So, overtime, right now, we’re seeing a shift of funding decisions that the state is making that is making it more difficult for nonprofits and easier for big municipalities.

Participants indicated that a shift away from small-scale, citizen-run restoration initiatives could mean a change in how restoration was carried out, and less funding going to place-based nonprofit groups.

Difficulties Securing Funding

There was broad agreement among participants that funding was decreasing, or at least, it was getting increasingly difficult to secure funding. Participants pointed out that historically, the Mattole enjoyed a high level of interest from funders, and a lot of money went to the watershed during a time when restoration was a very new industry. Participants highlighted increasing competition and a “boom-and-bust” funding model as factors potentially affecting funding availability.

Competition

Participants remarked on the increasing competition for grant funding. For many years, the Mattole was seen as “ahead of the pack.” It had organized watershed groups and a history of grassroots restoration programs. As of 2016, participants explained, there were many more nonprofit groups around the state with the capacity and skill to do restoration projects, who were also seeking funding. Participants also pointed out that rural municipalities and RCDs were competing for the same pools of government money in order to restore aging infrastructure, improve storm water systems, and other water quality related activities. In short, competition for restoration dollars had increased significantly. “It’s getting harder to get grant funding all the time,” said one participant, “and one of the things is, there’s similar problems to the Mattole everywhere, we’re not the only river impacted. And the state has limited funding for restoration.” Another participant, in reference to Humboldt County, argued,

More people are doing restoration work. If you go back to 2007, so like ten years ago, there was probably less work going on. Now there’s a lot more work with more groups doing it, so it’s more competitive. That’s

why it might seem like nonprofits are saying we're not getting as much funding.

Participants argued competition for funding was a significant hurdle to the continued growth of CBR in the Mattole, while also pointing to problems with the funding model.

Boom and bust funding model

Participants identified problems with the perceived “boom and bust” funding model. They argued the unpredictable and short-term nature of the public funding model made it difficult for watershed groups to plan far into the future or guarantee projects would be maintained, and for individual participants in the restoration economy to count on secure jobs. As this participant stated, “initiatives come up and there’s two or three years of funding, and then that dries up and hopefully something else comes up on line.” Participants argued the boom and bust funding model failed to provide predictable and secure funding – something watershed groups could build a real restoration community around, and people could build careers on. One participant put it this way,

I think the problem with the current model is that there’s no predictability. You don’t know if you’re going to get funding for particular projects this year, you don’t know if you’re going to get it next year... that poses problems for people that are trying to make a livelihood around this because no certainty in the medium term, not to mention the long term, that there is going to be work to do.

Participants noted that the rapid shifts and changes in funding made it difficult for watershed groups and restoration workers to adjust. “We have slower times and busier times,” explained one participant, “it can be challenging both to grow really fast and to shrink really fast. It’s hard for organizations in terms of changing their expectations, and it can be hard for employees if they thought they had a really long-term job and then it

dries up.” Another participant described the system as full of “underlying instability.”

This participant argued,

I think that the state in particular has shown a real lack of foresight in terms of the way funding is structured, because it's really set up to be boom and bust. The way it's structured is to be very much sort of project to project to project, and it doesn't really contribute to trying to build local stewardship or local knowledge or organizational capacity. I think those are all things that are sort of underappreciated. I think the way the current funding scheme is structured it doesn't really encourage any of those things.

Participants argued overly stringent regulatory, permitting and design requisites, coupled with an unreliable and unstable funding model, worked to discourage long-term growth and development of the CBR economy, as restorationists ended up spending valuable and limited time, money and energy chasing grants and fulfilling a growing list of requirements.

Part 3: Public and Private Funding in the Mattole River Watershed

Between 1980 (the creation of the first watershed group) and 2016 (when these data were collected) CBR developed into a notable economic presence in the Mattole. As Table 3 (public funding) and Table 4 (foundation funding) illustrate, the planning, design, implementation, monitoring and education of restoration projects and programs brought over 15 million dollars into the watershed between 2016-2008. This can be seen as a conservative estimate – the tables do not include every agency and foundation that contributed to the restoration economy in the Mattole during that time period. Table 3 shows funding from eight state and federal agencies that offered competitive grants in the

region. While not exhaustive, these eight agencies were the major contributors to CBR in the Mattole at the time of this study.

Table 3. Funding for restoration from government agencies, Mattole Watershed, 2008-2016, adjusted to 2016-dollar value.

Funding Year	<i>Bureau of Land Management</i>	<i>CA Department of Fish & Wildlife</i>	<i>CA Department of Water Resources</i>	<i>US Fish & Wildlife Service</i>	
2008	44,589	869,599	0	83,827	
2009	74,701	1,311,748	0	0	
2010	74,828	1,361,045	967,994	82,531	
2011	136,594	729,809	0	26,679	
2012	178,746	472,388	0	7,537	
2013	144,206	544,448	309,013	0	
2014	295,899	882,338	0	0	
2015	297,215	887,329	258,430	60,033	
2016	206,000	445,580	761,850	44,999	
Agency Totals	1,452,777	7,504,283	2,297,288	305,606	

Funding Year	<i>State Water Resource Control Board</i>	<i>Wildlife Conservation Board</i>	<i>National Oceanic & Atmospheric Administration</i>	<i>State Coastal Conservancy</i>	Year Totals
2008	0	0	128,193	0	1,126,208
2009	0	0	0	0	1,386,449
2010	446,073	0	49,519	660,248	3,642,238
2011	0	0	80,033	0	973,115
2012	0	0	0	0	658,670
2013	0	0	144,158	0	1,141,824
2014	0	0	0	202,788	1,381,025
2015	0	0	0	0	1,503,008
2016	0	921,792	0	0	2,380,221
Agency Totals	446,073	921,792	401,903	863,036	14,192,758

Table 4 shows funding from six foundations, and is a sample of the many foundations around the country that offered grants to non-profits with an environmental focus during this time period. These six foundations contributed over 1.3 million dollars to CBR in the Mattole during the years in question (the actual contribution from foundations is likely higher, as this is only a partial list). According to participants, grants from foundations were a very important part of the restoration economy. While alone these grants are not usually enough to pay for a restoration project, they help by paying for administrative costs, contributing to cost-share, and paying for other important steps in the restoration process, like monitoring and education. Participants indicated that foundations were increasingly important in the restoration economy.

Table 4. Funding for restoration from select foundations, Mattole Watershed, 2008-2016, Adjusted to 2016-dollar value.

Funding Year	<i>National Fish and Wildlife Foundation</i>	<i>Bella Vista Foundation</i>	<i>Firedoll Foundation</i>	<i>McLean Foundation</i>	<i>Tarbell Family Foundation</i>	<i>Bonneville Foundation</i>	Year Totals
2008	0	125,406	0	11,033	0	0	136,439
2009	0	167,832	0	0	0	33,566	201,399
2010	0	0	0	0	0	0	0
2011	0	157,937	0	0	2,134	32,014	192,085
2012	83,675	0	10,453	0	0	0	94,128
2013	0	144,206	0	0	1,030	0	145,236
2014	385,196	0	15,209	0	5,070	0	405,475
2015	0	0	0	0	5,063	0	5,063
2016	0	155,000	0	0	5,000	0	160,000
Foundation Totals	468,871	750,381	25,662	11,033	18,297	65,581	1,339,826

The data presented in Table 3 and Table 4 show there was a strong restoration economy in the Mattole Watershed as of 2016. The tables also reveal how funding for restoration varies year to year, and by funding agency and foundation. This suggests that funding for

restoration work can be unpredictable and inconsistent; there is not one, guaranteed, steady flow of funding that restoration and watershed groups can count on. For example, in 2008 and 2009 the California Department of Water Resources (CDWR) did not contribute any funding to the Mattole restoration economy, but in 2010 contributed nearly 1 million. However, these tables also reveal how the Mattole watershed groups were successful during this time period in consistently getting large sums of money for restoration initiatives. They diversified their funding sources (various agencies and foundations) and were not dependent on one source. In addition, considering the 40-year history of CBR in the Mattole, it is evident the Mattole groups have been consistently successful in attracting funding to the watershed for much longer than the years represented in the database. Figure 6 shows both public and private funding for restoration each year between 2008-2016, and illustrates the success of the Mattole groups, while also pointing to inconsistencies in funding.

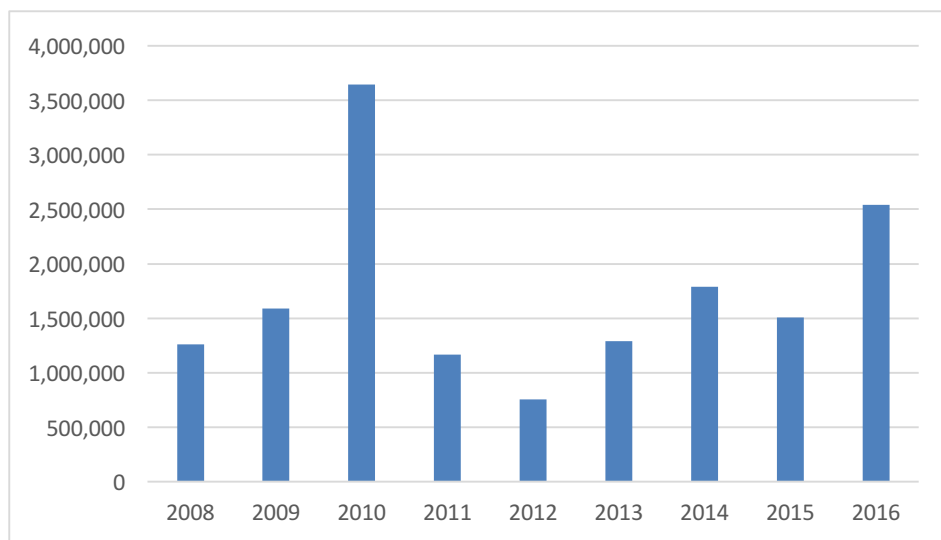


Figure 6. Public and private funding to the Mattole Watershed, 2008-2016, adjusted to 2016-dollar value

Participants reported the restoration economy was significant in the watershed. They pointed out the various watershed groups, and the numerous full-time, part-time and seasonal jobs they provided to local residents. One participant commented that in the downriver portion of the watershed, MRC was “the largest employer outside the cannabis industry” and had been for years. Another participant explained how a contractor who worked in the headwaters had been implementing projects for years, and that it was a main source of seasonal income. He went on to argue that there are numerous contractors and young workers who preferred restoration work over other types of labor, and would choose to do restoration exclusively if that was an option. One participant reflected on working with MRC in the early 2000s, and described years when over 150 people received a paycheck, and over 20 people had year-round work. While he acknowledged it was not enough to raise a family or buy land, he felt it was “meaningful” economically, and made it attractive for young professionals who wanted to learn about and participate in restoration to move into the watershed.

While participants acknowledged the economic contributions of restoration, they also claimed the impact was limited by the “boom and bust” nature of restoration, explaining that big influxes of funding cause the creation of new programs and projects, that then need people to run or implement them. During boom times, money was spent on local products and equipment, and the number of people receiving restoration-related paychecks increased. Whereas during bust times, funding receded, programs shrunk, and the watershed groups went into a period of less spending and hiring. One participant, speaking about SFI, explained,

SFI some years has 500-thousand pass through for restoration, 500-thousand worth of projects, [and it] mostly goes to local businesses and contractors. In a busy year, there's been summers where we've kept a couple companies busy all summer long, local companies. And that's just SFI. But we're kind of the only ones now doing stuff, so it's really a lot less. When MRC was doing Good Roads, Clear Creeks that was a big boom. They got a lot of money and a lot of work done and a bunch of guys, young guys, who got really excited and thought, this could be a livelihood for them. They got licenses and equipment and then the whole thing went away.

Participants also stressed the seasonal nature of restoration work, explaining how difficult it was to make a full-time living. Speaking about contractor work, one participant remarked, "we don't have any fulltime career jobs with benefits to offer... They're all seasonal, part-time jobs." Another participant observed, "I feel like restoration is a little bit of a bind, economically, in that, one of the main challenges I think restoration faces is, if you're going to get skilled workers, you have to offer consistent employment. But if you offer consistent employment, what do you do when you've done enough?"

Competition with the illegal cannabis economy was another challenge identified in interviews. Participants claimed the shadow economy took workers away from restoration, made housing scarce, and land prices high.

Discussion

Community Resilience and the Restoration Economy

The first wave of CBR in the Mattole was marked by innovation, determination, and the cultural energy of the 1970s and 80s. The back-to-the-landers arrived in the Mattole searching for a rural paradise away from what they saw as the destructive forces of mainstream western culture. Instead, they found a place in ecological crisis, and with a strong set of beliefs, ideals and values, set out to restore the watershed. First-wave restorationists laid a foundation, and set in motion a movement in the Mattole that has endured nearly 40 years, and has contributed to community resilience and well-being. CBR has contributed to resilience through economic growth and diversification, by building social capital and systems of communication, through facilitation of shared experiences and understandings, and by increasing the ability for collective action and decision-making and collective empowerment. Structural changes in CBR and trends and changes in funding and regulatory requirements have affected the way CBR and community resilience interact, posing both challenges and opportunities to further build resilience and well-being.

Economic Development

As Norris et al. (2008) and others (Houston, 2015; Sherrieb et al., 2010) have argued, economic development is an important component of community resilience. CBR contributed to economic development in the Mattole by bringing in nearly 15 million dollars between 2008-2016, increasing the level of financial wealth and resources

available in the watershed. CBR diversified the local economy by providing full-time, part-time and seasonal work opportunities for an assortment of individuals with varied skill sets and levels of education. While limited, and miniscule compared to the cannabis industry, the provision of diverse jobs is notable in such a rural, remote and economically narrow watershed. Furthermore, evidence from the database indicated that watershed groups were successful in securing significant grant funding each year between 2008-2016, and growth in the restoration economy since the 1980s suggests groups have been successful for much longer than that. This points to a relatively reliable economic sector, that will likely continue to provide work opportunities in the coming years, even as the illegal cannabis industry shrinks due to legalization.

Structural changes in CBR resulted in increased jobs and funding. The second wave of restoration brought in young professionals who had the skill and capacity to recruit more and larger grants, and developed creative new programs and projects that required skilled contractors, program coordinators, and other new job opportunities. The waves of CBR in the Mattole supported economic development, which in turn contributed to community resilience. However, results also indicated challenges facing further growth.

Results from the database show that overall, the Mattole was routinely successful in getting large amounts of money – with some years showing significant influxes of funding that likely reflected multi-year projects. However, results from interviews suggested increasing competition for funding made it more and more difficult to secure funding, while the professionalization of the sector caused project costs to double and

permitting and design requirements to become significantly more demanding. These changes could present challenges to CBR in the future, and negatively affect economic development if CBR groups were no longer able to regularly secure grants and/or were required to spend most of the funding on outside engineers and experts.

Overall, CBR positively interacted with economic development in the Mattole. At the same time, it is important to point out that a lack of funding and job security, and the predominately part-time nature of CBR, means the restoration economy is not going to solve rural economic development issues alone, and should be seen as one option to diversify and develop rural economies.

Social Capital

The second component in the community resilience framework is social capital (Houston, 2015; Norris et al., 2008; Sherrieb et al., 2010). By fostering common goals and values (Callaghan & Colton, 2008), facilitating involvement and participation in groups and activities (Aldrich & Mayer, 2017) and encouraging diverse collaborative partnerships (Magis, 2010), the CBR economy in the Mattole contributed to social capital.

The first wave of restorationists built connections through their common goals, values and beliefs. They created watershed groups, formed partnerships with government agencies, and organized widespread volunteer networks across the watershed. The second wave introduced new young people to the area who shared many of the same values, and who expanded the restoration economy by creating new programs, such as Good Roads, Clear Creeks and the Storage and Forbearance Program, that benefited many local

residents and increased trust between watershed groups, residents and landowners. From this point of view, the waves of CBR resulted in increased social capital.

However, results also indicated a perceived decrease in local volunteering, support and participation due to structural changes. A shift from a largely volunteer-based to a largely job-based restoration system, coupled with the green rush, led to a change in cultural values, and to how local people participated in restoration. Although results from interviews suggested this was negatively affecting the restoration economy, there was also evidence of ongoing local participation and support. Additionally, with the end of the shadow economy, it is likely the watershed will experience another shift in cultural values and local behavior as many green-rushers leave the area and homesteaders look for new economic opportunities. The social infrastructure put in place by CBR will potentially help the community bounce back during this time of transition.

Information and Communication

The third element in the community resilience framework has to do with how information is distributed to the public, and with systems of communication and narrative (Norris et al., 2008). CBR provided an outlet for residents to voice their opinions and concerns on local ecological and homesteading issues. Watershed groups held public meetings, put up road-side signs about water conditions, and formed collaborative partnerships internally and externally. By working with agencies, participants in CBR created and enhanced channels of communication, knowledge and information sharing. From the early days of fighting for permission to do CBR, through the second wave where restorationists developed creative new collaborative projects, CBR was a shared

experience among those who participated in it. This contributed to the creation of shared understandings and sense of place, or as Norris et al. (2008) explained it, a shared community narrative.

By facilitating the creation of place-based watershed groups, including local residents in programs and projects, providing an outlet for the sharing of knowledge, concerns, ideas and information and building a shared narrative, CBR contributed to systems of information and communication, which supported community resilience.

Community Competence

The final component of the community resilience framework is community competence, which is concerned with collective action and decision-making and local empowerment (Houston, 2015; Norris et al., 2008; Sherrieb et al., 2010).

The first wave of CBR introduced new energy and ideas and the capacity to tackle ecological problems. First-wave participants had the skills and knowledge to develop a restoration program, which required systematic and wide-spread data-collection, and learning about watershed functions, risks and challenges. They created three watershed groups, through which residents were able to plan, design and implement collective solutions to watershed problems. They also were able to acquire information from outside experts, professionals, scientists and agencies. Those initial efforts expanded and grew with the second wave. CBR in the Mattole both required and enhanced the ability for collective action and decision-making, and gave local people a voice in local natural resource management. It is important to note, however, that this study did not examine issues of empowerment in a real way. Norris et al. (2008) explained empowerment as

equal and fair distribution of access and control over resources. While this study suggests that through certain programs and through local support and participation CBR did contribute to more equal and fair distribution of access and control, it did not ask hard questions about who is not represented in CBR, who doesn't benefit from CBR, and who has power and who does not. These are important question to consider as the sector grows.

Based on the four components of the community resilience framework, as described by Norris et al. (2008), CBR contributed to community resilience in the Mattole River Watershed. CBR increased economic development, strengthened social networks and infrastructure, enhanced systems of information sharing and communication, and improved community competence. Lack of stable funding and jobs, increasingly stringent regulatory requirements, changes in social and cultural networks and value systems, and an absence of data on issues of power and control all pose challenges to growth for the restoration economy, and therefore to community resilience. These issues should be considered as CBR becomes more professionalized. At the same time, this study shows how CBR can be a valuable asset for rural communities in transition, and points to the importance of community-based, place-based and citizen-run models of natural resource management. As the restoration economy grows around the nation, the value of community-based models should not be diminished.

CHAPTER 2: BUILDING COMMUNITY CAPITALS THROUGH COMMUNITY-BASED RESTORATION

Introduction

The commonly accepted definition of restoration is “the act of assisting the recovery of ecosystems that have been degraded, damaged or destroyed” (Baker et al., 2014; Clewell & Aronson, 2007; Higgs, 1997; Kim & Hjerpe, 2011; SER, 2018). However, restoration is also deeply embedded in social, cultural and political processes, and there is a significant body of literature suggesting that understanding the human dimensions of ecological restoration is critical to the success and longevity of restoration efforts, and that place-based, participatory models can bring together competing interests and values to improve the knowledge base and restoration outcomes (Baker et al., 2014; Bliss & Fischer, 2011; Davenport, Mangun, Carver, Willard & Jones, 2010; Egan et al. 2011). At the same time, there is growing evidence that restoration can have important economic benefits, especially when conducted on a community level (Davis et al., 2011; Dabson, 2012; Kittinger, 2016). However, less has been written about the potential cultural, social, and political benefits of community-based restoration programs and projects.

This chapter seeks to make visible the benefits and challenges of decentralized, collaborative, community-based restoration efforts – what I call community-based restoration (CBR). Most studies focus primarily on the financial capital and job creation generated by restoration. I examine how the CBR economy interacts with cultural,

human, social and political capitals. My research questions are: how does the restoration economy build cultural, human, social and political capital? How does it benefit from these different forms of capital? What are some of the challenges facing development and growth in the restoration economy? My research methods were qualitative: I did a series of 20 semi-structured interviews with stakeholders in the Mattole restoration economy, and engaged in participant observation.

Literature Review

Since the 1950s, public confidence in centralized, top-down government regulation has declined, and there has been growing interest in collaborative, community-based natural resource management models (Lurie & Hibbard, 2008; Wagner & Fernandez-Gimenez, 2008). Hierarchical government agencies (like the Bureau of Land Management and the U.S. Forest Service) were once assumed to be rational, efficient organizations with the ability to implement sweeping management regimes and policies based on objective costs and benefits. This top-down, one-size-fits-all model is increasingly seen as inappropriate and ineffective for the complex and multi-faceted problems in natural resource management (Lauber, Decker & Knuth, 2008; Lurie & Hibbard, 2008). With declining biodiversity and shortages of natural resources around the world, there is mounting recognition of the need for alternative ways of managing landscapes and natural systems. Community-based models have been embraced internationally as a counter to top-down, command-and-control management.

While on a global scale, there has been a significant paradigm shift in natural resource management (Berkes, 2004), on a national scale this shift has occurred in the context of declining natural resource industries and struggling rural economies (Gosnell & Abrams, 2009; Hibbard & Lurie, 2013). Across the U.S., rural communities are experiencing significant economic, social and cultural restructuring (Gosnell & Abrams, 2009). However, there is a growing body of research pointing to a “new natural resource economy” as an alternative solution to revitalize rural economies (Hibbard & Lurie, 2013).

This literature review will examine community-based restoration (CBR) in the context of the Community Capitals Framework (CCF). I utilize the CCF as a way to understand the way the restoration economy interacts with long-term, sustainable economic development and community well-being. I will start with a discussion of community capitals. Next, I will look at literature on decentralized, collaborative models of natural resource management, examine how CBR draws from and fits into these approaches, and identify challenges. Finally, I will suggest that CBR has the potential to enhance, build and/or contribute to community capitals.

Community Capitals Framework

In 1986, Pierre Bourdieu argued that to understand the structure and functioning of the social world, it was necessary to look at capital in all its forms. He claimed the capitalism-based approach of economic theory failed to recognize the role of non-financial forms of capital, and how other forms of capital affected and interacted with long-term economic success, sustainability and growth (Bourdieu, 1986). Following this

line of thinking, the Community Capitals Framework (CCF) was developed by Cornelia and Jan Flora and Susan Fey (2004) as a way to analyze community and economic development. It is based on the premise that communities are dynamic, complex and constantly changing, and to truly understand their potential and ability to grow and develop, it is necessary to look beyond purely economic factors (Callaghan & Colton, 2008; Emery & Flora, 2006). The CCF argues communities are made up of various assets, resources or capitals, which can increase or decrease over time, upon which all stakeholders rely and contribute to. The seven capitals are natural, cultural, human, social, political, financial and built (Callaghan & Colton, 2008; Donoghue & Sturtevant, 2007; Emery & Flora, 2006; Magis, 2010). Table 5 outlines these seven forms of community capital. The CCF posits that to support healthy, sustainable community and economic development, all seven types of capital should be considered and invested in (Emery, Fey & Flora, 2006).

Natural capital is the resources, amenities, natural beauty, and ecosystem services provided by ecosystems and available to a community (Emery et al., 2006; Emery & Flora, 2006). Natural capital is often assessed in terms of stock (trees, fish, water), services (natural pest control, clean air and water) and attractiveness and access to landscape features (mountains to hike, camping, swimming) (Callaghan & Colton, 2008; Emery et al., 2006). Natural capital is depleted by decisions that negatively affect the environment, and enhanced by actions that restore, conserve, support or protect the environment (Callaghan & Colton, 2008).

Table 5. Community Capitals Framework, following Emery & Flora, 2006 and Callaghan & Colton, 2008.

Natural Capital	The natural resources, assets or services provided by local ecosystems and available to communities (i.e. weather, natural resources, amenities, ecosystem services and natural beauty)
Cultural Capital	The way communities organize, develop, and behave – what they value, the way people see and interact with the world, as well as their traditions and language. Cultural capital influences whose voices are heard, and how creativity and innovation emerge
Human Capital	Includes the level of education and skill, and the ability to develop/enhance community resources, as well as the ability to access outside resources and bodies of knowledge to increase understanding and identify promising practices
Social Capital	Connections/relationships that develop among people and organizations to make positive or negative things happen – through bridging, bonding and linking
Political Capital	Includes the access to power and organizations, as well as the ability to participate in decision-making and engage in actions that contribute to the well-being of community
Financial Capital	The financial resources available to invest in capacity-building, support the development of businesses, support civic and social entrepreneurship, and accumulate wealth for future community development
Built Capital	Built infrastructure that supports the community and other forms of capital.

Cultural capital can be understood as the way people “see the world” and behave within it (Emery et al., 2006). It influences what voices are heard and listened to, what voices have influence within the community, and how creativity and innovation emerge and are nurtured (Emery et al., 2006). Cultural capital can include local festivals and traditions, languages spoken or a strong work ethic, and is reflected in what a community values, invests in, protects or works to restore (Callaghan & Colton, 2008; Emery et al., 2006). Bourdieu (1986) argued cultural capital is one of three fundamental forms of capital (along with economic and social). He saw cultural capital as largely related to

family-life, and as a result of the time and resources the family invested in specific endeavors, and more importantly, was *able* to invest. Furthermore, Bourdieu (1986) pointed out that human capital – defined as education, talent and skill – is itself the product of an investment of time and cultural capital.

Human capital is defined by the level of education, skill, spirituality, emotional stability, physical health and capabilities of people within a community, as well as the ability to access outside resources and bodies of knowledge in order to increase local understanding and learn about emerging practices (Emery et al., 2006; Callaghan & Colton, 2008). A community with a strong stock of human capital has educated, trained and healthy workers (Woolcock, 1998) and affective local leadership. Human capital is enhanced when residents are given opportunities to better themselves, and basic needs are met on a broad-scale. It is eroded by events or situations that prevent basic needs from being met, and that limit social, economic and personal growth opportunities (Callaghan & Colton, 2008).

Social capital can be seen as a set of social relationships, obligations or connections (Bourdieu, 2006) that develop around shared values and beliefs (Callaghan & Colton, 2008). Social capital develops through involvement and participation in groups and activities (Aldrich & Meyer, 2015) and facilitates collective action for mutual benefit (Woolcock, 1998). Social capital builds trust and social cohesion, and allows residents to access the resources they need and to problem solve (Aldrich & Meyer, 2015; Callaghan & Colton, 2008). Social capital forms through bridging, bonding and linking (Aldrich & Meyer, 2015; Magis, 2010). Bonding refers to close ties among individuals (such as

friends or family) or tight bonds to a particular group, and builds community cohesion (Aldrich & Meyer, 2015; Emery et al., 2006; Magis, 2010). Bridging involves loose ties that create and maintain bridges between organizations and communities, between different organizations, or between different social groups (Aldrich & Meyer, 2015; Emery et al., 2006; Magis, 2010). Linking is the vertical relationships between local groups, organizations and citizens and those with power or authority on a regional, state or nation level (Aldrich & Meyer, 2015; Magis, 2010). Social capital increases with activities that create feelings of tolerance, trust and security, and decreases in situations that create greed, distrust and fear (Callaghan & Colton, 2008; Emery & Flora, 2006; Magis, 2010).

Political capital is the ability of individuals and communities to participate in decision-making and engage in actions that contribute to and affect the well-being of the community, and to have access to those individuals and organizations in positions of power and control at the regional, state and national level (Emery et al. 2006; Emery & Flora, 2006).

Financial capital is the flow of money available to support livelihoods, invest in capacity-building, support the development of new or existing businesses, support individual goals and civic and social entrepreneurship, and accumulate wealth for future community development (Callaghan & Colton, 2008; Emery & Flora, 2006).

Built capital is the infrastructure that supports the community. This can include roads, water and sewer systems, telecommunications, parks and public gathering places and buildings (Emery et al., 2006).

In the CCF, the interaction among these community capitals is what ultimately determines sustainable development and community health and resilience (Callaghan & Colton, 2008). Emery and Flora (2006) found that investments in key capitals (identified as human, social and financial) built assets in other capitals. They referred to this as spiraling up (Emery & Flora, 2006). On the other hand, when human and financial capital leave a community, social capital decreases, which can trigger a downward spiral (Emery & Flora, 2008). For example, the depletion of fisheries in rural, coastal fishing communities can trigger the loss of natural and financial capital, which then contributes to the degradation of cultural and social capital (Callaghan & Colton, 2008). The CCF also points out that if left unused over a long period of time, community capitals tend to deteriorate (Cornhusker Economics, 2015). Donoghue and Sturtevant (2007) argued that long-term community well-being depended not just on strong and balanced stocks of community capitals, but on the ability to activate and continuously invest in these capitals.

Community-based restoration

Literature that directly defines CBR is limited. Hall et al. (2015) conceptualized CBR as people restoring environments in their own communities – often dependent upon a large volunteer base. Hart (2002) depicted CBR as grassroots and voluntary, as opposed to restoration carried out by large government agencies. Leigh (2005) described CBR as active engagement of local communities in restoration efforts, and argued CBR brings diverse residents together, develops a sense of place, fosters local empowerment, and works to reconnect humanity with the environment. These studies paint a picture of CBR

that is voluntary, bottom-up and place-based. However, in seeking to define and further understand the roots of CBR, it is helpful to examine community-based natural resource management (CBNRM), which is better established, contains many of the same principles, and has been extensively studied.

The model of CBNRM came into widespread, international use in the 1980s (Blaike, 2006), and is based on the premise that local populations have a greater investment in sustainable natural resource use than the State, are more aware of local ecological processes, and are likely to be effective through the use of local or ‘traditional’ practices (Brosius, Lowenhaupt & Zerner, 1998). CBNRM emphasizes, “flexible, place-based, multi-interest, cooperative efforts linking private and public partners for problem solving” (Lurie & Hibbard, 2008, p. 431). Wagner and Fernandez-Gimenez (2008) conceptualized CBNRM as, “groups of diverse stakeholders who convene voluntarily to work on natural resource policy, planning or management issues specific to a particular location” (p. 324). Over the years, scientists and land managers have outlined common principles for local, collaborative approaches to natural resource management. While there is not one model for community-based management, there are common themes and characteristics, including: decentralization, diverse and voluntary local engagement, identification of community values and needs, productive collaboration across public and private spheres, individual and collective action, and inclusion of local or traditional knowledge (Curtain, 2015; Long, 2008; Davenport et al., 2010; Kim and Hjerpe, 2011). CBR utilizes all of these characteristics, with particular emphasis on collaborative partnerships. The CBR economy requires cooperation at multiple levels: between

landowners/residents and watershed groups, between different watershed groups, and among watershed groups, residents and public government agencies.

Challenges of CBR

CBR is place and site-specific. Therefore, it encounters different challenges depending on the location, community and project. However, researchers have identified three common challenges facing collaborative, community-based natural resource management models that can be broadly applied to CBR related to funding, power and control, and standardization.

Funding for CBR flows primarily from state and federal government agencies down to local organizations, and funding streams can be unpredictable, scarce and highly competitive (Baker & Quinn-Davidson, 2011; Davis et al., 2011; Lurie & Hibbard, 2008). This makes long-term planning difficult, and can translate into undependable jobs and programs that are rarely ensured for more than a year or two (Lurie & Hibbard, 2008). One study characterized the restoration funding sector as a roller coaster full of bureaucratic hoops, and argued that funding caused concern for the long-term sustainability of the restoration industry (Baker & Quinn-Davidson, 2011).

Another significant challenge is related to the issue of power, control and trust: how are different social and cultural groups included in the development, implementation and enforcement of restoration laws, regulations and policies? (Baker et al., 2014). How is authority and responsibility devolved? (Berkes, 2004). Baker et al. (2014) argued restoration practices are deeply embedded in legal regulations, and thus the professional norms and knowledge claims held by government agencies shape decision-making

processes. Blaike (2006), in a case study of 14 African countries, argued CBNRM had largely failed to deliver the predicted benefits – claiming local knowledge was unable to negotiate on an equal basis with the official, scientific knowledge of the NGOs and funding entities. In some cases, what was sold as a community-based approach was actually a “power grab” by external or internal forces, overturning existing relations and structures in the pursuit of a conservation agenda (Blaike, 2006). This can weaken local support, as environmental goals are seen as insensitive and antithetical to rural people and their livelihood needs (Berkes, 2004).

There is evidence of an ongoing “standardization” or “professionalization” within the community-based natural resource management model (Baker & Quinn-Davidson, 2011; Blaike, 2006; Brosius et al., 1998; Higgs, 2005). The argument is that for efficiency, replicability, legal recognition, technical growth and scientific advancement, some degree of uniformity is required. This has resulted in ever-growing lists of required conditions, assets and skills in an effort to “standardize the local” (Blaike, 2006, p. 1950). The concern is that a standardized approach to community-based management may likely overlook the diversity and complexity of rural communities and obscure social differences and local politics of inequality (Blaike, 2006; Brosius et al., 1998). In addition, standardization can have the effect of making it more difficult for communities to participate in management, as many residents lack the formal training, licenses, education and skills required to participate in a formal process (Baker & Quinn-Davidson, 2011).

CBR and Community Capitals

Despite these challenges, there is evidence to suggest that restoration initiatives implemented at the local level can contribute to rural economic development and community well-being (Baker, 2005; Dabson, 2012; Davis et al., 2011; Kittinger et al., 2016). Through decentralization, communities are given more responsibility, authority and recognition, which can clarify ownership boundaries and increase resource security (Kim & Hjerpe, 2011). This can build political capital by giving residents a collective voice, and encourages the growth of human capital by ensuring needs are met. Inclusion of local and traditional knowledge can work to restore culture as well as ecosystems (Kimmerer, 2011) – making people feel heard, creating bridges and bonds between residents and groups, and encouraging a cultural respect for shared natural resources. CBR can increase social learning, improve the knowledge base, build a sense of shared responsibility, bring together competing interests and resolve conflicts (Baker et al., 2014; Davenport et al., 2010). CBR can also take advantage of existing human capital and capacity, especially in resource-dependent places with declining extractive industries, and create new jobs and economic stimulation. Kittinger et al. (2016) found community-based restoration in Hawaii had substantial economic benefits, created a skilled workforce, and helped revitalize cultural practices and traditions. They argued this place-based approach illuminated the socioeconomic and cultural benefits of restoration (Kittinger et al., 2016).

Methods

I used a qualitative research approach, and framed the data collection and analysis process within grounded theory and case study design.

Constructivist Grounded Theory

Grounded theory is a set of flexible guidelines that aim to build theories through successive and simultaneous data collection and analysis and development of concepts (Charmaz, 2005). The goal of grounded theory is to generate or discover a theory – often when a theory doesn't already exist to describe a practice (Creswell, 2007). In this approach, study participants have all experienced a phenomena or process in which the resulting information will be “grounded” (Creswell, 2007). Following Charmaz, I used a constructivist grounded theory approach, which includes an emphasis on the phenomena of the study, the shared experiences of researcher and participants, and the researchers' relationship with the participants (Charmaz, 2005). Considering my positionality in the Mattole, this framework allows for the acknowledgement and inclusion of my varied and complex history with restoration and with the restoration practitioners interviewed – some of whom are family members, past teachers, community elders, work colleagues and old-friends who I collaborated with on past restoration-related projects. In addition, constructivist grounded theory recognizes the diverse local views, multiple realities and complexities of views that exist in any community group (Creswell, 2007). This means that all views and stories recorded are valuable to the theory generating process, even if they do not fit into a common theme.

Case Study Design

Case study design is a type of observational research that builds in-depth description and understanding of a specific situation (Newing, 2010). A case study aims to get detailed understandings for the purpose of generating a theory about underlying issues. The Mattole is a good case study of CBR because: 1) I have an insider's perspective and access to restoration work and workers (practical); 2) the Mattole has a long and complex history of small-scale, community-based restoration (theoretical); and 3) restoration and related activities make up a significant part of community life in the Mattole (prominence) (Newing, 2010).

Semi-Structured Interviews and Participant Observation

Semi-Structured Interviews

I conducted a series of 20 semi-structured interviews with key stakeholders in Mattole watershed ecological restoration. Stakeholders included past and present nonprofit employees, an agency employee, landowners and community elders. Many of the nonprofit employees additionally fit into one or more of the latter mentioned categories. For example, there were community elders who also worked many years for a nonprofit, or independent contractors who also served on a board of directors (appendix A). I developed an interview template with open-ended questions and prompts (appendix B). Interview questions varied slightly depending on the participant (their role in the restoration economy) and my relationship to them (I had extensive knowledge about the expertise of some participants, and would ask questions that related to their specific experience and knowledge). Participants were chosen based on snowball sampling and

my experience living and working in the Mattole. Each interview lasted between 1.5 and 3 hours. Interviews took place in participants homes, in restaurants, at restoration sites, and in participants' places of work. Each interview was partially transcribed and then analyzed for key reoccurring themes. I ended up with 10 major themes, such as benefits of CBR and challenges of CBR. Each theme was entered into an excel spreadsheet with a series of secondary codes. For example, the theme "benefits of CBR" included the secondary codes of "collaborative partnerships, local knowledge, connection to place" etc. Each secondary code was populated with quotes, and measured by frequency (did every participant bring it up?) and explanatory power (did it address my questions? How important was it to participants?).

Participant Observation

Between interviews, I volunteered with a crew implementing a restoration project in the Mattole headwaters, and worked installing monitoring wells along McKee Creek (a tributary to the Mattole). Both experiences helped frame my research, and allowed me to spend time conversing with restorationists and observing restoration.

Results

The results section is organized into three parts. Part one examines how CBR interacts with culture in the Mattole. Part two looks at what it means to do restoration in place, and focuses on local participation, the creation of collaborative partnerships and the role of local and generation knowledge. Part three identifies challenges and opportunities facing CBR.

Cultural Implications of Community-Based Restoration

Participants expressed a belief that restoration is about more than fixing damaged or destroyed ecosystems. Many participants indicated that, as a species, humans have degraded our relationship with the non-human world, and that restoration can begin to heal it. The general sentiment was that engagement with restoration can help individuals and communities reconnect with nature, and in reconnecting, cultural attitudes and behaviors can begin to shift. Expression of this idea revealed itself in statements such as, “an important part of restoration really isn’t just fixing nature, it’s restoring our balance and our proper attitude and relationship to nature, because the destruction of that relationship is what got us where we are right now.” Another participant commented,

To me a lot of it has to do with kind of creating, in a pragmatic sense, generations of people who see themselves as biophiles, people that love the land they are living in and are doing everything they can to mitigate human beings impacts that have been accruing over a long time.

The concept of restoration as a way to heal the human/nature relationship runs deep in CBR in the Mattole. The original restorationists were predominantly back-to-the-landers who left urban city centers in the 1970s and 80s to live simpler, more holistic lives in

rural areas. For them restoring the Mattole Watershed had dual meaning. They wanted to bring back the native salmon runs, but they also wanted to address some of the destruction that capitalist, corporate America had wrought upon the rivers, mountains, forests and indigenous peoples of the earth. One participant, reflecting on the early years of restoration in the Mattole, explained,

Most of us tend to think that (restoration) has to do with restoring the earth, restoring salmon habitat, restoring redwood forests... to bring back those stores of things and renew them. I would submit that for many of us it was a pathway to help also to restore ourselves, and find our place in the puzzle.

He acknowledged there was no going back – people in the Mattole drove cars and had televisions – but he saw restoration as a way to learn better stewardship, and to build a relationship with local ecological processes. Another participant contended,

I would say restoration is simply relearning how to be good stewards. We as a culture, at some place in history, lost our ability to be good stewards of the land. We also need to restore our skills at being good neighbors for each other. We need to restore our remembrance of how to be good land stewards but also just members of the human race.

Participants saw the increasing disconnect between people and nature as a fundamental problem facing the future of modern civilization, and restoration as an important tool in addressing that problem. They argued a healthy relationship between people and nature is what builds a sustainable, restorative system, and the loss of that relationship is what had caused ecological destruction. One participant claimed the land itself is the ultimate teacher, and argued an important part of restoration is listening and looking at the land. “I find many times that actual connection and sensitivity to the land that surrounds you is really important and is an element that many people don’t include,

because they feel that it's "woo-woo" or whatever it may be," she explained. Another participant described the experience of working on a restoration project that required the removal of a substantial number of trees.

I go out there and I sit with the trees, and ask, how does this feel? It actually feels really good when I go out there in the summer time because it's so dry. And it feels like for the bigger area it's the best thing. And for those trees, I actually talked to them and asked if they would be willing to give up their lives to go in the creek and be a house for fish, and I felt like they were okay with that. But it was really important for me to have that process.

One participant advocated approaching the restoration process "with care and love" arguing such an approach ultimately results in better restoration. She described the practice of taking the top soil and putting it in a pile, and then when the project is finished, spreading it back around and planting native grasses. "The top soil," she contended, "if you save it has the seeds and stuff. And you don't lose your carbon. As we continue to learn, it turns out when you're looking at things in terms of relationship, the things you'll be motivated to do are actually pretty in line with the science." In this approach, restoration is as important culturally as it is ecologically, and serves a much broader purpose.

Place-Based Restoration

A major theme running throughout interviews was the concept of restoration in place, which participants described as the act of doing restoration in the environment or ecosystem you reside in. Participants identified this as an integral part of their restoration experience, and critical to the longevity of the restoration movement in the Mattole. Participants claimed that place-based restoration fostered long-term learning, encouraged

the inclusion of local and generational knowledge, required local support and participation, and created diverse, collaborative partnerships.

Long-term Learning

Participants maintained that place-based restoration contributed to a process of long-term learning, and that this process was an important part of how CBR functioned in the Mattole. In the early years of the Mattole restoration movement, the founding members of the MSG and MRC put great emphasis on the concept of place, and on forging a connection to place. From the beginning, CBR in the Mattole was place-based, and initiated by the people who lived there. As this participant and 40-year Mattole resident and restorationist recounted:

(Our) first project was to try to put pressure on the county to repair the culvert, and we used Fish and Game to do that, but it was our initiative, it was a local people's initiative, and this is a really important point. Restoration wasn't something the government decided to do, what forced the restoration movement was people living in specific places, specific watersheds, tributary watersheds, taking on tasks of dealing with damage that had been done to the land. When we lived here, we lived in the watersheds, our observations were first hand and consistent, and over the long run, much deeper and more complex than superficial surveys... So, the job of restoration fell to those who cared the most, and who had potentially the biggest stake, and that was the people living in the watersheds.

Participants described Mattole ecology as dynamic and shifting. They argued living in one place for a long period of time fostered a deep understanding and relationship to the constantly changing natural processes of the Mattole, especially through the practice of restoration. They indicated restoration in place resulted in long-term learning through engagement with the rivers, forests, plants and animals of a defined geographic region,

and in a recognition of the human role in a dynamic system. One participant reflected on this experience, explaining,

Every time I go out in the field there's something that surprises me. I discover something, or something I thought I knew is challenged. Or I see an animal or some tree or some plant growing in a place or in a time when I wouldn't have expected, even based on being here 10 years. What is really interesting to keep learning is that the natural environment continues to surprise you.

Another participant observed,

I think my understanding of how the processes work and how these species behave has grown tremendously, partly because I've stayed in one place this long. When you move all the time you don't know the species... here they're old friends. Working with a dynamic ecosystem, like a stream in particular, when you see it at one given time, you see like a little snapshot, but when you see that same spot year after year after year, you see it change after each storm and after each flood and get to see it in really low flows and really high flows and see how it shifts. With the forest, it takes longer to see change, but now that I've been here 20 years I can really see how the forest changes as it grows. I can see it growing.

Participants indicated that long-term learning allowed them to look at the landscape with an understanding that comes with years of experience. Participants recounted rain events that moved great amounts of sediment – moving the entire river from one bank to the other. They described projects swept away, or left high and dry on the wrong bank. They watched adult coho return to spawn in tiny headwaters creeks after implementation of habitat structures, and then juvenile coho stranded that summer when the structures didn't hold enough water to withstand another year of drought. Participants argued experiences such as these contributed to a process of long-term learning, which in turn led to better, more creative restoration. They reported that doing restoration in place allowed them to see the results of their work long-term, to learn from both successes and

failures, and to see how projects reacted to weather events like flooding and drought and how they held up over time. As one participant explained,

When I worked in Montana I would go to a site, do a big project, and I would never see it again. I've still never seen what it looks like. In the Mattole, it's like you're constantly seeing the successes and failures of your work, and so you're totally dialed into your project, which is really awesome.

Some participants claimed place-based restoration work is often higher quality than work done by crews or companies that are not connected to the place. They argued when the project is located where restorationists live, there is a higher level of personal investment in seeing long-term success. One participant asserted,

I've seen lots of really low-quality work done, when I've worked outside the watershed, and you have people that aren't connected to the project. Here in the Mattole, at least on my projects, we see the need, we design the project, you know, nobody has to tell me how to build it when I get there because it's my project, I made the project, I saw the need for creative design, I shepherded the whole thing.

Another explained,

The whole thing in the Mattole is that, (it) has persisted over a long period of time. The only reason that it has worked for 30 years is because the people in the watershed care about it and are trying to keep it going and nurturing it and so forth. And I think that's the whole story.

The participant later expanded, saying of the MRC, "It's the constancy of community vision and kind of ability to detect evolving problems in the watershed over a multi-decade scale that I think it really, at the end of day, it does."

Local Participation and Community Support

According to participants, one way local support and participation has contributed to CBR in the Mattole is through active and healthy relationships between residents and watershed groups. One participant explained:

Without community buy-in the projects, once they're done, they just languish. Nobody says, oh hey a log came loose, or oh the rocks are falling, or, you know, the fish aren't getting past here. You need that. The community needs to feel like it's their project. Not something imposed by the outer world of the government that everyone hates. It needs to feel like a community project.

Participants claimed that when landowners and residents have trust in the Mattole groups, and believe they are trying to improve watershed conditions for the benefit of the community, they get involved and help the groups by letting them know when they see a problem. Participants gave examples such as juvenile salmonids trapped in evaporating pools, a rock slide blocking fish passage, and a malfunctioning project. When I was working at SFI, it was common for community members to call or stop by, either to give information or receive it. Once a community member called about a large group of adult chinook salmon spawning by her house, and another time someone called about a huge tree that had fallen across her creek. Participants argued the nonprofit groups benefited from having community support and trust – it vastly improved their ability to understand current conditions, and to respond to issues as they arose.

Participants claimed local participation and cooperation allowed watershed groups to put together comprehensive projects and to approach restoration on a watershed-wide scale. One participant stated:

I think the Mattole has sort of out-performed based on the fact there is this really compelling social narrative, number one, and number two, the depth of landowner engagement and acceptance of restoration allows the Mattole to present projects that are much more comprehensive on a watershed scale. That's a huge advantage that the Mattole brings in competing for these dollars.

This point was reiterated in many interviews. CBR depends on grant funding, which is increasingly competitive and difficult to secure (see chapter 1). Having community support in the form of letters, financial contributions, volunteers and landowner participation was a significant factor in securing grants from both public and private funders. Funders want to see projects have local support. As participants pointed out, this can be difficult, but is something the Mattole has excelled at. One interviewee identified getting local buy-in as one of the hardest factors in CBR, and argued having a physical presence in the watershed – for example an office where residents can stop by – was a critical part of being able to do outreach efficiently. This individual pointed out,

You know everybody, you know how to get ahold of them. You can twist their heart if you have to, and call a neighbor, and get somebody else's number. The Mattole Restoration Council's success was largely based on that, and I think Sanctuary Forest's success is largely based on that. So yeah, that has been a strength of the Mattole groups, and something I see missing in other watersheds where I work.

As with other aspects of CBR in the Mattole, participants pointed out that community engagement began in the early years of the Mattole restoration movement. Restoration in the Mattole came directly from the people. In interviews, participants told stories of early “covert” restoration efforts. People were so committed, they would illegally relocate stranded juvenile fish, go out in storms to take water samples, and once opened the river mouth with shovels and wheel barrows. According to participants, that

commitment had not disappeared, but it had changed. Some participants reported the Mattole was losing the passion and urgency of the early years. Both older and younger generation participants expressed this belief, and concern that a loss of local participation would change what restoration means in the Mattole. One participant stated,

(In the Mattole) the whole concept of restoration came from the community. I think we as restorationists, as a restoration community, need to be watchful that we don't lose broad community support just because we're having such high turnover and people are moving here who are not restoration minded. I think that's a concern about the relationship between restoration and community. We're seeing a population that is less and less attuned to the needs of the watershed.

Participants argued the pull of illegal cannabis cultivation had caused the resident population of the Mattole to shift over the years. While the wave of back-to-the-land settlers in the 70s and 80s focused on reinhabitation and reconnecting with nature, the wave of settlers brought on by the green rush focused more on buying land and maximizing profits. One participant, when asked about community participation and support, commented,

In some ways, I feel like support for restoration is getting broader but shallower. I feel like there are continually fewer people who are in outright opposition, but at the same time, the level of investment in a sort of emotional or social sense is decreasing.

In other words, it was not that green rush residents did not care about the land, river and fish, but it was not a top concern or reason for moving to the watershed. Participants indicated this led to decreasing support on the part of local residents. At the same time, many told stories of ongoing community support and participation. One participant recounted how during the drought of 2002, the Sanctuary Forest office received

numerous calls from alarmed residents who were witnessing the deaths of thousands of juvenile salmonids, and how in meetings and conversations between local residents and watershed groups, the idea for the SFI Storage and Forbearance Program was born. “So, the community posed the question,” she explained, “Could it be that human use is really a main cause here? And we said okay, well, we’ll do the science to see.” That program went on to become an important milestone in the Mattole restoration movement, one that has been recognized by the State Water Board as an “innovative approach to addressing stream flow” (Whitney, 2015) and held up as a model by the California Department of Fish and Wildlife (Bernard, 2010). The Storage and Forbearance Program gave landowners professional and permitted water systems capable of storing 50,000 gallons of water in exchange for entering into a legally-binding, 15-year agreement not to pump from the river or tributaries during low-flow periods (typically from July-November). As of 2017, the program had over 20 landowners enrolled – as well as Whitethorn Elementary School and the Whitethorn Construction complex, which included several local businesses and residential units – and according to participants many more landowners were participating on their own by purchasing storage systems, and voluntarily forbearing from pumping by observing the “stop pumping” dates posted by SFI on their website and roadside signs. In 2014, another component of the program was created – dreamed up and carried out by a SFI Board member and 30+ year Mattole resident. Called the Blue Fish Program, it consisted of fish cut out of plywood and painted blue that forbearance participants post on their mailboxes, fences and driveways. One participant stated,

I would say the water program with the tank program has probably brought the community together the most of any restoration. Especially when we did the blue fish. When people were proud of what they were doing and wanted to have a blue fish at their driveway and then other people were saying how do I get a blue fish, and started learning more about what it meant to forbear and a lot of people getting tanks on their own.

While it seemed true that community participation had changed, it was also evident it was still an important part of the restoration movement. Another participant described SFI's Van Arken Project, which entailed purchasing 1,300 acres of rugged, working timberlands in the headwaters and turning it into a community forest (Greenson, 2017). He described part of the funding plan, explaining,

We've started this public campaign asking for community support, and out of that has come our "Fund an Acre" campaign whereby landowners, supporters of the project are pledging to fund an acre which is approximately \$5500 over five years, or all at once, or with their partners, or with neighbors, or with reading groups, fire councils, road associations, cannabis cooperatives, etc. It's something that anybody can do.

At the time of writing (June 2018) the Fund an Acre campaign had raised nearly half a million dollars, primarily from local Mattole residents (SFI, 2018) including pledges from all of the groups mentioned in the above quote. In the words of this participant:

That's how this movement has grown. Somebody else gets excited, and they don't sit around waiting for the government to give them a grant, and the enthusiasm and sense of individual capacity and responsibility has driven this movement far more than any other single force, and it has made it ours. By ours I mean the residents of this place. It's one of the things that distinguishes the Mattole, it's perhaps the single longest lasting, most successful effort by citizens to restore the health and productivity of an entire watershed.

Collaborative Partnerships

Over the decades, the nonprofit restoration groups in the Mattole have developed and sustained diverse partnerships with government agencies and organizations outside the watershed. Participants identified these collaborative partnerships as an integral component of CBR in the Mattole. Participants identified numerous benefits of collaborative partnerships. In this section, I will look at the benefits most frequently discussed: collaboration as a bridge between the Mattole communities and the state and federal government, and collaboration as a way to encourage multiple points of view and share different kinds of knowledge.

Collaboration as a bridge

Participants pointed to the way collaboration within CBR can act as a bridge between community and state. They saw restoration as a way to build connections between the Mattole, and the larger geographic and political region. One interviewee described this role by stating,

You can't just start digging in the creek, you need somebody to do the permits. We're able to connect people to that, we're able to make that happen. And since we have community relationships we're able to talk to the community, hear their concerns, and connect them to other people, or government agencies or the contractors or whoever needs to be connected to, to make that happen.

The Mattole Watershed is rural and isolated. The towns are unincorporated, there are no town councils or mayors or municipalities. If a landowner wants to improve their property – such as putting in water storage or conducting forest thinning or burning – it can be difficult to navigate the permitting and regulatory requirements. Because

watershed groups have long-standing relationships and partnerships with government entities, they can often facilitate landowners with regulatory processes, and build bridges between landowners and state and federal agencies. In addition, with increased water use regulations in rural areas due to drought and legalization of cannabis, many participants stated that landowners found themselves in a daunting situation as they tried to come into compliance. Participants argued the watershed groups could serve as a potential resource and advocate for residents. This participant described the vision behind Sanctuary Forest,

[The founders] really strongly expressed this vision that Sanctuary Forest would be the conduit, or the bridge, between the community and those agencies. We would be the feet on the ground, knowing what the conditions are of the watershed and hearing the voice of the community and taking that to the agencies, so that they wouldn't just be applying their blanket management structure. It would be informed.

The watershed groups were able to connect with regional, state and federal entities, and in the absence of local government structures, advocate for community needs and natural resource issues.

Diverse viewpoints and knowledge sharing

In addition to serving as a bridge, participants claimed collaborative partnerships supported CBR by bringing diverse voices to the table, and encouraging creative thinking and the sharing of ideas. For example, one participant described the process of how new ideas are generated, explaining how multiple ideas are brought to the table, and how, “that group-minded process of having a lot of input generates better ideas than one person's idea.” Other interviewees talked about the Technical Advisory Committees (TAC) in the Mattole. These committees are generally made up of state and federal

agency personnel (i.e. NOAA, BLM, CDFW), nonprofit staff and private landowners, who discuss the needs of the watershed and set priorities for restoration efforts. One participant praised the TACs as, “a fantastic way for the decision making to happen.” The committees bring people with different skill sets and experience levels together to share knowledge and ideas. One interview participant expressed how this felt, saying, “I have this experience of almost 20 years on the ground, and I’m sitting next to somebody who’s got a PhD in hydrology, and they’re looking at me eye-to-eye, you know, I have an equal voice.” Another participant described collaboration as a melding of sometimes completely different philosophies on how to conduct restoration, and suggested, “it’s really good to bring them both to the table and then figure out what you want to do.” Multiple study participants pointed out that, since the Mattole has such a long history of collaborative partnerships in CBR, a cultural of “knowledge sharing” had developed. Restoration groups brought in experts to learn from, other groups (for example the Nature Conservancy) come in to learn from restoration groups, and a cycle of knowledge transfer and idea sharing ensued.

Local and Generational Knowledge

Participants revealed broad recognition of the importance of local and generational knowledge in the development and maintenance of restoration projects. “It’s really important...the experience of not only the elders, but just people that have lived in this area for generations. They have a breadth of knowledge that is just really amazing and something I had never experienced before coming into this area,” expressed one

study participant. Another participant recounted the story of a tributary meeting hosted by SFI in 2016,

They talked about how when the culvert was taken out and the bridge put in, the water dropped dramatically. I don't think any of those people from the Salmon Group had heard that before. And so that was really important. That could be used to input into future projects. And to help put together the puzzle of why that creek has such low streamflow problems. And in the future, if taking out culverts and putting in bridges, put some logs in to help keep the streambed and not let it all go down to the ocean.

In this example, a project carried out by professionals – and done according to the CDFW restoration manual – had unintended consequences: the streambed dropped dramatically, disconnecting it from the floodplain and losing groundwater infiltration. Residents who lived along the creek noticed the change, and expressed their concern at the community meeting. Here was a situation where local experience and knowledge could prevent future mistakes, and inform future projects. Despite the fact it was done according to the regulations and with all the correct permits, the creek did not respond in the expected way. One participant argued:

The community needs a voice. The tributary (meeting) way is a very meaningful and powerful way to get input and learn from people's experiences and place-based knowledge. This work has a direct impact on communities. The future of restoration must have community input at the planning stage, and should offer jobs and volunteer opportunities when possible.

Several participants pointed to the knowledge of octogenarian and third-generation Mattole resident Bob McKee, whose innovative work with ponds and rainwater catchment in the 1970s and 80s is credited as the inspiration behind some of the most innovative water conservation work in the Mattole headwaters. Long before

“restoration” was a household word in the watershed, Bob was building ponds in Mattole headwaters tributaries. One of his most influential pond projects was a series of in-stream ponds built in Buck Creek in the Mattole headwaters. During the worst drought years of the early 2000s and 2010s, Buck Creek continued to flow, even when the Mattole River stopped flowing just upstream. Nearly 50 years later, restorationists are trying to replicate his results in other Mattole tributaries in an effort to keep enough water in the headwaters for juvenile salmon to survive the summer months. At the time of this study, Sanctuary Forest was half-way finished with a series of five off-channel ponds in Baker Creek (a tributary in the headwaters). They hoped the ponds would slowly infiltrate the ground and seep into the creek throughout the dry summer months. The project is directly linked to knowledge gained from studying the Buck Creek ponds. One study participant reflected, “Actually, I think that the biggest link to local knowledge out here is [Bob].”

Challenges and Opportunities

A Model for Restoration Funding

Participants felt grant funding through state and federal agencies had grown increasingly competitive and unpredictable, and requirements more rigorous, demanding and expensive (see chapter 1). Participants found these trends in funding troubling, and identified them as a significant challenge facing CBR in the Mattole. Participants argued in the long-term, funding would need to diversify beyond a focus on state, federal and foundation grants.

For the nonprofit model, participants proposed a funding system that would guarantee a certain amount of money to watershed groups. They argued this could lead to

a more stable restoration economy and create more predictable long-term jobs.

Participants described a model that included a combination of individual tax breaks and incentives, a guaranteed pot of money for watershed groups, and an additional pot of competitive funds. One participant described a system in which, if a watershed group could demonstrate local capacity and ability to implement restoration, they would receive a long-term base amount to be used for some small-scale restoration and assessments. There would be an additional pool of competitive money that groups could apply for in order to implement larger and more complex projects. The participant felt such a system would, “result in a much more stable environment where a lot more of these groups, like the MRC, can persist in the long run.”

Several participants discussed a model in which restoration receives more support from private sources and the market. Participants argued restoration should be more directly integrated into ongoing land management and stewardship, such as logging and other forestry-related operations. One participant felt there is currently an opportunity and a market for “smart, young, entrepreneurs” to pursue innovative ideas like opening a “restoration-oriented saw mill” in the Mattole valley. The mill would help landowners with sustainable forestry practices and make products to be branded and sold under an environmentally-friendly label. Another participant discussed a model based in land conservation where a nonprofit owns and sustainably manages industrial timber land to generate revenue. Participants pointed out timber is the largest source of natural capital in the Mattole Watershed, and argued when the shadow economy shrinks, the forest will be the natural wealth of the community. Therefore, they felt managing it in a way that builds

resilience to climate change will likely be one of the biggest and most important challenges for Mattole residents in the coming decades. One participant remarked,

To me that would be a really important compliment beyond going for grant work, which will also have to continue, but if you can't count on grants more than a year out and they kind of come and go based on whether a bond was passed recently I do feel like there has to be this private, for profit compliment to it.

Legalization of Cannabis

Participants claimed the cannabis shadow economy shaped and changed CBR in the Mattole. They argued that in the early years of the restoration movement, illegal, small-scale cannabis cultivation supported the growth of CBR by providing funds and allowing back-to-the-landers to invest countless volunteer hours on projects. One participant remarked, “In my mind, the restoration economy grew out of the weed economy. Weed allowed people to settle in the hills.” Another explained how when the watershed groups started, they didn't pay any staff, and only raised enough money to do small projects, asserting:

I think we enjoyed that out here for many years in part because we had, as a valley, an income source that didn't take a ton of our time that we could make a reasonable living doing, and then volunteer the rest of our time. All over Humboldt County we see this...all these community-minded people who suddenly had access to money and also had time, simultaneously. (It) all kind of correlated with the start of the restoration movement.

However, participants argued that as the shadow economy grew, it became a source of ecological degradation, and gave rise to a new wave of residents who did not move to the Mattole to “get back to the land.” One participant explained, “the marijuana culture...it allowed undeniably a lot of people to settle in and to build homes and to raise their

children. But once it became a permanent fixture, we're endangered by it." Another pointed out that "subsequent generations have taken the weed economy to the next level," arguing it had grown out of control and drew people from all over the world. There was broad agreement among participants that cannabis cultivation was a challenge facing CBR in the Mattole. As one participant observed, "what we're seeing now is an incredible intensification of the boom. It's a race to the bottom. It's pretty much a hopeless enterprise, what happens when it's gone?" That was a question all participants raised and identified as a troublesome unknown for CBR in the watershed. The Mattole was on the brink of a major shift – what happens when cannabis is legal in California? This section will examine participants' thoughts on how legalization will affect CBR.

Many participants expressed optimism that the legalization of cannabis would positively affect CBR. They predicted once the industry was out in the open, secrecy and mistrust among residents would decrease, and there would be less incentive to grow on heavily forested mountaintops with no water and poor soil. Participants argued many people moved to the Mattole specifically to grow cannabis, and often did not utilize good management practices or have a relationship to the place. "You talk to them about salmon in the river, they're like, oh yeah, I totally support what you're doing, I'll throw \$1000 dollars out at a fundraiser," explained one participant, "but then they go home and create another greenhouse pad." Participants expressed frustration at the damage and degradation that cannabis cultivation had caused to recovering ecosystems. They argued that if it became harder to make a lot of money growing cannabis, the typical landowner of the Mattole would shift away from people with a focus on cultivation back towards

more community- and stewardship-minded residents. One participant described a future without the shadow economy, and said with the legalization of marijuana,

A lot of the ecological and social impacts that are currently taking place in this watershed go away. And the attractiveness of growing a crop in steep, unstable land that's not really suited to it decreases. What might happen, is a lot of that type of land use and simply a large number of the people who are here now will not be here in 10 years. And we'll be left with people who are more interested in living here, not because of all the money they can make, but because they are in love with this place. And we could have a community of people who are actively stewarding the land and really deeply involved in community efforts.

While all participants expressed the belief that a healthy future for CBR will require the shadow economy to shrink, some argued cannabis should remain part of local livelihoods. Participants described a scenario where cannabis continued to provide residents with good jobs, just not at the expense of ecological functions, and not in the current “boom” state. “Maybe the hope and dream for the future is finding the balance where cannabis is a valuable source of income but it doesn't crowd out everything else,” contemplated one participant.

Several participants saw the potential for cannabis to become a source of funding for restoration, and some were already seeing it happen. Landowners who want to grow and sell their crops legally must become compliant, which often requires them to make significant upgrades to their operations and follow strict environmental guidelines. This ranges from small projects, such as installing more water storage or moving greenhouses further from riparian zones, to larger projects, such as replacing culverts and reshaping roads. As a result, for-profit companies (Pacific Watershed Associates and Stillwater Sciences were identified in interviews as examples) are getting inundated with

restoration-related jobs that are not grant funded. One participant commented, “I think the cannabis thing is kind of creating a different funding source. Cannabis farmers are being forced into paying for restoration. So, it’s a different economic funding source for restoration.” Another participant observed that “for profit restoration groups are getting buried with jobs to help landowners comply with new cannabis regulations and permits. These are not grant funded. This has never happened before.” Some participants pointed out legalization could provide an additional source of funding for the Mattole watershed groups. One participant suggested groups look into consulting for cannabis, helping with compliance, and working with landowners to get permits. Several others speculated that once cultivation is legal, cannabis farmers might be willing to underwrite projects or contribute to programs as a way to show community support, and as an advertising strategy: farmers who want an eco-friendly brand could list endorsements from local watershed groups.

Discussion

Community Capitals and Community-Based Restoration

Nearly four decades ago residents in the Mattole started a citizen-led, grassroots restoration movement. This research suggests that over the years, it evolved into an important cultural, social and economic component of the watershed, and has contributed to sustainable community development and well-being. Using the CCF, as described by Emery and Flora (2006), this section will examine how CBR in the Mattole interacted with cultural, human, social and political capitals.

Cultural Capital

Emery et al. (2006) conceptualized cultural capital as the way people see the world and act within it. Back-to-the-land settlers brought with them a set of cultural attitudes, values and beliefs that influenced how they approached restoration. They saw CBR as a relationship to place, as a way to heal the human/nature divide, and as a way to restore the role of people in healthy, resilient ecosystems. These cultural values influenced how early restorationists saw their place in the world, and how they behaved within it. The cultural capital brought by back-to-the-landers formed the roots of CBR. In turn, CBR cultivated cultural capital by engaging residents with local ecosystems and through a process of long-term learning – forming a circular and reciprocal relationship between CBR and cultural capital (Figure 7).



Figure 7. Relationship between cultural capital and community-based restoration.

Existing cultural beliefs, values and attitudes about nature led to the formation of a community-based restoration movement. The restoration movement reinforced those cultural values and beliefs through interactions with place – participants described forming relationships with specific plant and animal species, and with streams and creeks and forests. Callaghan and Colton (2008), argued cultural capital is reflected in community values, and by what a community chooses to invest in, protect, or restore. By this measure, the interaction between CBR and cultural capital in the Mattole was reflected in community participation and support for restoration efforts, and by the practices and traditions that formed around restoration. Through efforts to conserve, restore and steward their place, people in the Mattole developed a “restoration culture.” There was a high level of community awareness and participation in restoration efforts – many residents participated in summertime water conservation efforts, attended meetings and workshops and volunteered for watershed groups.

Human Capital

The early CBR movement in the Mattole required considerable human capital, defined as skill, capacity, knowledge, education and the ability to access outside resources and support (Callaghan & Colton, 2008; Emery & Flora, 2006). Back-to-the-landers brought formal educations, diverse skill sets and an influx of fresh energy and ideas. They possessed the skills and capability to seek assistance, go through the formal channels to put pressure on county and state government agencies, and find mentors and teachers. Early efforts also benefited from human capital in the form of local and generational knowledge. Ranchers, loggers and homesteaders who had lived in the

watershed all their lives or for multiple generations had a different set of skills and experiential knowledge to contribute. Human capital provided the assets needed to get CBR started in the Mattole. CBR then supported the growth of human capital (Figure 8). Through a process of long-term, place-based learning, and through collaborative partnerships and community participation, the local knowledge base expanded, and local skill and capacity was enhanced. Local residents gained a deep understanding of natural processes and local species, young, educated professionals were attracted to the watershed, and a diverse variety of biologists, engineers, hydrologists, and other experts came to participate in, inform, and learn from projects. These investments in human capital then supported the continued growth of CBR.



Figure 8. Relationship between human capital and community-based restoration.

Social Capital

This section will look at how CBR in the Mattole contributed to social capital, through bonding, bridging and linking. Bonding refers to close ties among individuals or tight bonds to a particular group, and builds community cohesion (Aldrich & Meyer, 2015; Emery et al., 2006; Magis, 2010). Bridging involves connections and relationships between organizations and communities, between different organizations, or between different social groups (Aldrich & Meyer, 2015; Emery et al., 2006; Magis, 2010). Linking is the vertical relationships between local groups, organizations and citizens and those with power or authority on a regional, state or nation level (Aldrich & Meyer, 2015; Magis, 2010).

Bonding

Early restorationists came together to work towards a common goal, and through their mutual interests (and guided by the stocks of cultural and human capital they brought with them) formed watershed groups, partnerships and relationships within the watershed. As Aldrich and Meyer (2015) explained, this is how social capital develops: through involvement and participation in groups and activities. Investments in social capital then builds trust and social cohesion, and allows residents to access the resources they need and to problem solve (Aldrich & Meyer, 2015; Callaghan & Colton, 2008). In the Mattole, participation in CBR was an investment in social capital – by working together, communicating, collaborating and learning, trust grew between residents and watershed groups (Figure 9). Residents reported ecological issues, called with

information, showed financial and social support, and attended events and meetings. This trust and social cohesion then created and reinforced common goals and interests, which supported the growth of CBR.



Figure 9. Relationship between social capital and community-based restoration.

Bridging

CBR contributed to bridging social capital by bringing diverse groups and individuals together to work towards a common goal and by building trust across social groups (Aldrich & Meyer, 2015; Magis, 2010). The restoration economy created work for

ex-loggers and ranchers (and their children) who were able to use their skills to become restoration contractors. Projects like Van Arken brought in funding from such diverse groups and individuals as fire councils, cannabis collectives, road associations, community reading groups, illegal cannabis farmers, and local business owners.

Tributary meetings were attended by new residents, generational families, cannabis cultivators, organic farmers and many others. Young cannabis farmers worked part-time in the summer season implementing restoration projects. Long-time ranchers, loggers and cannabis farmers served alongside back-to-the-landers, academics and school-teachers as board members for watershed groups. CBR built trust across social groups through programs like Storage and Forbearance and Good Roads, Clear Creeks, which provided valuable services to diverse families and landowners (fixing culverts and roads, offering water storage systems and assistance, etc.), by advocating for local needs and rights (assisting with permitting and regulations, speaking for the needs of people as well as fish, etc.) and by gathering local and generational knowledge (including voices from various groups in restoration projects.) However, it is important to note that this study did not directly ask how CBR interacted with and affected different social classes or groups, nor did it ask questions about power distribution and control. All participants were stakeholders in the restoration sector, which skewed the results towards a restorationists' point of view (as opposed to a logger, rancher or cannabis farmer – although some participants fit into two or more of these categories). Some of the points made above came directly from interviews, but much of it was gleaned through participant observation.

Linking

Through collaborative partnerships with agencies, foundations and other environmental organizations outside the watershed, Mattole residents and watershed groups created links with broader knowledge bases and environmental circles. Watershed groups had decade's long partnerships with agencies like the BLM and CDFW, coordinated collaborative programs such as the TACs, and worked with organizations like The Nature Conservancy. Through these linking activities, CBR built communication and relationships across watershed boundaries, bringing in diverse voices, ideas and knowledge – like a spider web of social connections. This improved the ability of watershed groups to develop innovative projects, to secure funding, and to implement cohesive projects and programs on a watershed scale, which in turn improved the ability of CBR to continue and expand. The melding of minds and knowledge led to innovation and creativity.

Political Capital

CBR began to build political capital in the Mattole early on. Back-to-the-landers found a watershed in ecological crisis, and did not agree with how county and state agencies were managing it. Using their human and cultural capital, early restorationists pressured government entities such as Fish and Wildlife to grant them permission to participate in local natural resource management. With the creation of the watershed groups, restorationists had a platform, which they used to form partnerships with agencies, and implement the native hatch box program (along with other programs, research and initiatives). According to Emery and Flora (2006) actions such as this build

political capital by increasing local ability to participate in decision-making and engage in actions that contribute to and affect the well-being of the community, and by giving local residents access to individuals and organizations in positions of power and control. The partnerships and relationships watershed groups formed with regional, state and federal agencies gave people in the Mattole access to people with power in natural resource management decision-making, and a voice in how their shared resources were managed. The projects implemented through these collaborative partnerships provided the basis for further programs and projects, which supported and enhanced the CBR movement (Figure 10). The absence of any formal government structures in the Mattole meant landowners were responsible for compliance with state water law, county building codes, and other regulations related to living in a rural, unincorporated area.



Figure 10. Relationship between political capital and community-based restoration.

CBR created an environment where landowners and residents were able to reach out to watershed groups for support in navigating these hurdles. Watershed groups were a resource and advocate for local people, working to streamline permitting for water storage, helping landowners secure funding for projects, and working with regulatory agencies.

Interaction Between Capitals

Donoghue and Sturtevant (2007) argued that sustainable community development depended not just on strong and balanced stocks of community capitals, but on the ability to activate and continuously invest in these capitals. In the Mattole, the cultural capital brought by the back-to-the-landers was activated by CBR, and CBR was consistently and continuously reinforced and activated by cultural, human, social and political capitals. It was this reciprocal relationship between CBR and these four capitals that supported an on-going process of community development and well-being. In the CCF, the interaction among community capitals is what ultimately determines sustainable development and community health and resilience (Callaghan & Colton, 2008). Investments in key capitals (human, social and financial) built assets in other capitals (Emery & Flora, 2006). In the Mattole, CBR amounted to investments in cultural, human, social and political capitals. Early restorationists invested in their cultural and human capital by starting a restoration movement, which increased social capital by creating new connections and relationships, and built political capital by facilitating the creation of collaborative partnerships with government agencies.

Community Capitals and Cannabis Cultivation

CBR in the Mattole developed alongside the illegal cultivation of cannabis. The shadow economy affected community capital in positive and negative ways. With the legalization of cannabis in CA, the Mattole will likely experience shifts in community capitals.

In the 1970s, 80s and even into the early 90s, cannabis supported the restoration movement, and also enhanced community capital. Small-scale, illegal cultivation provided the financial capital needed to allow restorationists to volunteer their time and energy, create watershed groups and donate to early efforts. One could argue that the early cannabis culture also contributed to other capitals – for example by creating a sense of camaraderie among different stakeholder groups and bringing people together for a common economic goal. The shadow economy allowed people to build homes, open small businesses, found community nonprofits, and donate generously to local causes and community events.

However, the shadow economy also posed serious challenges to community capitals. As it grew, so did secrecy and distrust among neighbors. The shadow economy encouraged a culture based on individual gain, and caused residents to keep to themselves. This eroded social networks, and attracted a new type of resident: people who did not have a place-based connection to the Mattole, and who were not concerned about ecological health and long-term vitality of community. Natural capital suffered as mountaintops were leveled, forests clear-cut, and tributaries drained of summer flows. In

the final years of the green rush, community tensions grew high: people were too busy to help one another, and fearful of what the future held.

Legalization of recreational cannabis use in California will likely bring dramatic change, as cannabis cultivation will no longer be the powerful force it once was. It is possible that legalization will lead to an initial consolidation and decrease in some community capitals. Some people will move out of the watershed, and businesses may close – leading to a decrease in financial capital, a shift in human capital, and a corresponding drop in social capital. However, this could be followed by a restructuring and increases in community capitals. It will once again be beneficial for neighbors to work together in order to save time and money – increasing social capital. Secrecy will decline as cannabis farmers come out of the shadows, and there will likely be a renewed emphasis on stewardship and sustainable management as jobs in the restoration sector begin to look more attractive, green rush residents leave the watershed, and increasing regulations incentivize landowners to live more responsibly. In the early years of CBR, there was a powerful emphasis on leaving behind capitalism and materialism, working together, and re-inhabiting the landscape. The green rush ushered in an era marked by accumulation of wealth and material goods and an emphasis on the individual. The pendulum swung from one extreme to the other. Now with legalization, there is an opportunity for a middle ground.

CONCLUSION

Together, these two chapters make an argument for CBR as a way to enhance and diversify rural economic development, and support long-term community well-being and vitality. The core argument is twofold: 1) to fully understand rural economic development, it is necessary to look beyond financial indicators – we must also take stock of social networks, cultural values, human capital, systems of communication, access to power and control, and community competence. And, 2) in the search for alternative ways to revitalize rural communities, CBR is a valid option that can enhance all of these elements, as well as contribute directly to financial wealth. At the same time, the instability of the funding model and evidence of professionalization, as well as the inherently seasonal and short-term nature of restoration projects and programs, suggest communities should approach CBR as just one component of a diverse, vibrant rural economy. The restoration economy would benefit from further research, including questions such as: How do you build a community-based restoration economy in places without existing forms of community capital? Are there better funding models for a restoration economy? What would that look like?

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APPENDICES

Appendix A: Interview Participants

Participant	Age Class	Position in restoration economy	Male/ Female	Length of Residence (Years)
1	36-50	Current watershed group employee and board member (MRC)	F	11
2	36-50	Current watershed group employee (MRC & MSG)	M	11
3	36-50	Current board member (MSG)	F	21
4	36-50	Current watershed group employee (MRC)	M	12
5	51-65	Past watershed group employee (MRC & MSG)	F	15
6	51-65	Current watershed group employee (MRC)	F	30
7	36-50	Past watershed group employee (MRC)	M	8
8	36-50	Past watershed group employee (MRC)	M	10
9	81-95	Past watershed group employee, present watershed group board member (MSG)	M	48
10	66-80	Past watershed group employee (MSG) & board member (MRC), current board member (MSG) –	M	40
11	51-65	Current watershed group employee (MSG)	M	5 & worked in Mattole on and off for 40+
12	36-50	Past watershed group employee (MRC)	M	24
13	51-65	Current watershed group employee (SFI)	F	50
14	20-35	Current watershed group employee (SFI)	M	28
15	20-35	Past watershed group employee (SFI)	F	Worked in Mattole for 4
16	36-50	Current watershed group employee (MSG) and board member (SFI)	M	21
17	81-95	Community elder	M	60
18	66-80	Founding member, independent contractor, educator	M	49
19	51-65	BLM employee – has worked with Mattole watershed groups for over 10 years	M	Worked with Mattole groups for over 10 years
20	51-65	Past consultant for Mattole restoration projects - part of early efforts at restoration	M	7

Appendix B: Sample questions for semi-structured interviews

1. This interview is about ecological restoration. I'd like to start by asking you about your vision of restoration in the Mattole. What does restoration mean to you?
2. Tell me about how you got involved with restoration work.
 - a. Current job?
3. Do you think restoration is a significant or notable economic presence in the watershed?
 - a. How are restoration projects funded?
 - b. Have you noticed any changes in funding during the time you have been working in restoration?
4. What are the ways you have seen people in the community participate in restoration?
 - a. Who participates from the community/who doesn't?
5. I'm interested in how different types of knowledge are represented in the restoration economy in the Mattole.
 - a. Whose voices do you see represented?
 - b. Do you see [different participants] in the restoration economy using knowledge differently?
6. To wrap up, I want to discuss the future. What is your vision for the future of restoration in the Mattole? How do you think we get there?
7. Thank you so much for meeting with me today and sharing your experiences. Is there anyone else in the Mattole you think I should meet with and interview?

Appendix C: Sample survey on the restoration economy

Name of Agency or Foundation:

Name of contact person:

Address:

Phone:

Email:

Date:

About the Project: This research will look at ecological restoration in Humboldt County and the Mattole River Watershed. Research will be conducted in two parts: part one will look at public and private funding for ecological restoration in Humboldt County, following two previous studies done in 2003 and 2008 in order to describe the size of the restoration economy in terms of amount of money brought into the county. The goal is to update the years 2008-2016, to investigate if funding has increased or decreased, if number of projects has increased or decreased and if type of project has shifted. Part two will address ecological restoration in the Mattole River watershed, and will look at small-scale, community-based and site-specific restoration, at what restoration means to the local residents who participate in it, the role it plays in creating a sense of place and the long-term goals.

Definition of Ecological Restoration, from the Society for Ecological Restoration: the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. For the purposes of this study, I am including planning, monitoring and education as part of the restoration process.

For further information or questions: contact graduate student researcher Marisa Formosa at (831) 295-1169, email mlf458@humboldt.edu or Professor Erin Kelly (responsibly faculty) at (707) 826-4150, email erin.kelly@humboldt.edu

For the years 2008 to 2016, please fill in the following information, or send a similar project database:

